

Client:	Anchor QEA	Date:	September 23, 2021
Address:	21328 2nd Drive SE	Project:	Q.C Lower Duwamish Waterway
	Bothell, WA 98021	Project #:	21B233
Attn:	Garrett Timm	Sample #:	B21-1427 - 1446
Revised on:		Date sampled:	7-7-21 & 7-8-21

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	Please See Attached Reports		Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count			LA Abrasion	
X	Moisture Content	Please See Attached Report	X	Direct Shear	Please See Attached Reports
	Specific Gravity, Coarse		X	Specific Gravity, Soils	Please See Attached Reports
	Specific Gravity, Fine				
X	Hydrometer Analysis	Please See Attached Reports			
X	Atterberg Limits	Please See Attached Reports			

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted, Meghan Blodgett-Carrillo

WABO Supervising Laboratory Technician



Moisture Content - ASTM C566, ASTM D2216

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: August 23, 2021	Tested by: A. Eifrig

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B21-1427	LDW21-GT10-GB-0-1.5 ft	233.1	600.7	434.9	165.8	201.8	82.2%
B21-1428	LDW21-GT10-GB-0-9 ft	233.1	804.9	583.3	221.6	350.2	63.3%
B21-1429	LDW21-GT10-GB-9-14 ft	221.7	1019.4	669.5	349.9	447.8	78.1%
B21-1430	LDW21-GT10-GB-14-19 ft	224.1	475.2	368.0	107.2	143.9	74.5%
B21-1431	LDW21-GT10-GB-19-24 ft	217.2	895.4	719.1	176.3	501.9	35.1%
B21-1432	LDW21-GT10-GB-24-25.5 ft	233.7	639.9	567.2	72.7	333.5	21.8%
B21-1433	LDW21-GT28-GB-0-1.5 ft	208.6	1012.3	678.5	333.8	469.9	71.0%
B21-1434	LDW21-GT28-GB-0-10 ft	222.9	1087.3	729.8	357.5	506.9	70.5%
B21-1435	LDW21-GT28-GB-10-11.5 ft	302.0	1045.9	721.9	324.0	419.9	77.2%
B21-1436	LDW21-GT28-GB-10-15 ft	303.4	1236.5	827.0	409.5	523.6	78.2%
B21-1437	LDW21-GT28-GB-15-16.8 ft	311.0	880.9	647.2	233.7	336.2	69.5%
B21-1438	LDW21-GT28-GB-16.8-20 ft	223.0	1069.1	875.2	193.9	652.2	29.7%
B21-1439	LDW21-GT28-GB-20-21.5 ft	221.8	951.4	801.9	149.5	580.1	25.8%
B21-1440	LDW21-GT21-GB-0-1.5 ft	222.7	653.9	446.8	207.1	224.1	92.4%
B21-1441	LDW21-GT21-GB-0-13 ft	234.6	1463.8	860.0	603.8	625.4	96.5%
B21-1442	LDW21-GT21-GB-13-16 ft	225.2	1059.7	808.7	251.0	583.5	43.0%
B21-1443	LDW21-GT21-GB-16-17.5 ft	233.1	805.2	661.3	143.9	428.2	33.6%
B21-1444	LDW21-GT21-GB-16-21 ft	215.7	1239.6	953.1	286.5	737.4	38.9%
B21-1445	LDW21-GT21-GB-21-25.7 ft	225.1	772.5	628.4	144.1	403.3	35.7%
B21-1446	LDW21-GT21-GB-26-31 ft	108.4	1248.4	956.1	292.3	847.7	34.5%
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All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:



Moisture Content - ASTM D854

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: August 25, 2021	Tested by: A. Eifrig

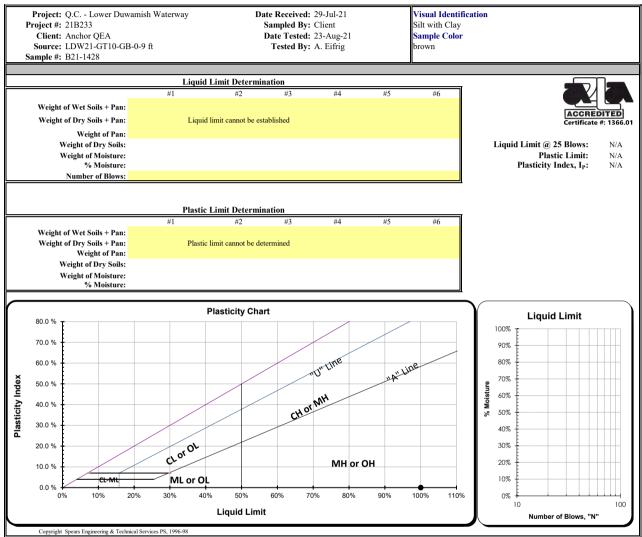
Sample # B21-1428	Location LDW21-GT10-GB-0-9 ft	Tare 584.04	Dry Soil + Tare 660.85	Mass of Dry Soil 76.8	Pycno ID TSA-011	Mass of Pycno 190.3	Volume of Pycno 499.5	Density of Water @ Tx 0.99754	Mass of Pyeno filled w/ water & soils 734.30				Temp. Correction Factor 0.99933	Corrected SpG 2.464069
B21-1431	LDW21-GT10-GB-19-24 ft	501.90	602.67	100.8	TSA-021	183.4	499.4	0.99754	742.98	681.60	23.0	2.5581693	0.99933	2.5564553
B21-1442	LDW21-GT21-GB-13-16 ft	510.13	611.47	101.3	TSA-020	195.0	499.5	0.99754	755.39	693.29	23.0	2.5824927	0.99933	2.5807624
B21-1445	LDW21-GT21-GB-21-25.7 ft	500.61	577.32	76.7	TSA-022	198.0	499.5	0.99754	742.91	696.21	23.0	2.5560327	0.99933	2.5543202
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Reviewed by:

Meghan Blodgett-Carrillo





All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our

Comments: Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the liquid limit cup without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Visual Identification Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Sampled By: Client Silt with Clay **Project #:** 21B233 Date Tested: 23-Aug-21 Client: Anchor QEA Sample Color Source: LDW21-GT10-GB-9-14 ft Tested By: A. Eifrig Sample #: B21-1429 **Liquid Limit Determination** Weight of Wet Soils + Pan: 40.29 42.71 29.23 Weight of Dry Soils + Pan: 37.17 38.71 25.20 Weight of Pan: 28 61 28 25 15.04 Liquid Limit @ 25 Blows: Weight of Dry Soils: 8.56 10.46 10.16 Weight of Moisture: 3 12 4.00 4.03 Plastic Limit: N/A % Moisture: Plasticity Index, I_P: 36.5 % 38.2 % 39.7 % N/A Number of Blows: **Plastic Limit Determination** #2 Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Plastic limit cannot be determined Weight of Pan: Weight of Dry Soils: Weight of Moisture: % Moisture: **Plasticity Chart Liquid Limit** 80.0 % 100% 70.0 % 90% Un Line 60.0 % A" Line Plasticity Index 50.0 % 60% 40.0 % 50% 30.0 % Cro, Or MH or OH 20% 10.0 % 10% ML or O 100% 0% 10 100 **Liquid Limit** right Spears Engineering & Technical Services PS, 1996-98

Il results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding or

Comments: Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Reviewed by:

Meghan Blodgett-Carrillo

Source: LDW21-GT10-GB-14-19 ft Sample#: B21-1430

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 23-Aug-21 Tested By: A. Eifrig

Visual Identification

Clayey Silt Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D43} \\ \textbf{D}_{(5)} = 0.001 \\ \textbf{D}_{(10)} = 0.003 \\ \textbf{D}_{(15)} = 0.005 \\ \textbf{D}_{(30)} = 0.009 \\ \textbf{D}_{(50)} = 0.024 \\ \textbf{D}_{(60)} = 0.031 \\ \textbf{D}_{(90)} = 0.072 \\ \textbf{D}_{(60)} = 0.072 \\ \textbf{$ mm % Gravel = 0.0%% Sand = 8.0% mm % Silt & Clay = 92.0% mm mm Liquid Limit = n/a Plasticity Index = n/a mm Sand Equivalent = n/a

mm Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 0.79$ Coeff. of Uniformity, $C_U = 9.14$ Fineness Modulus = 0.04

Plastic Limit = n/a Moisture %, as sampled = 74.5% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face =

					Di	$D_{(90)} = 0.072$ ust Ratio = 90/97	111111		cture %, 2							0, 1 Fa 2+ Fac	
ASTM C136, ASTM D6913, ASTM C117																	
		Cumulative	Interpolated Cumulative		Í				Grain Size D	stribution							
Sieve		Percent	Percent	Specs	Specs		5 % ⊆	설 : 본 3 경우 c	% % %	4 80°	888	8888	28				
US	Metric	Passing	Passing	Max	Min	-	00%				****	****	 		ПППП	ТТ	T 100.0%
12.00"	300.00		100%	100.0%	0.0%		H										1
10.00"	250.00		100%	100.0%	0.0%		90%						*				90.0%
8.00"	200.00		100%	100.0%	0.0%		70%						II N				70.0%
6.00"	150.00		100%	100.0%	0.0%								 				1
4.00"	100.00		100%	100.0%	0.0%		80%						k		шш		80.0%
3.00"	75.00		100%	100.0%	0.0%		<u> </u>						 				1
2.50"	63.00		100%	100.0%	0.0%												1
2.00"	50.00		100%	100.0%	0.0%		70%										70.0%
1.75"	45.00		100%	100.0%	0.0%												1
1.50"	37.50		100%	100.0%	0.0%												1
1.25"	31.50		100%	100.0%	0.0%		60%										60.0%
1.00"	25.00		100%	100.0%	0.0%	. is								\			1 3
3/4"	19.00		100%	100.0%	0.0%	% Passing	50%							1			50.0%
5/8"	16.00		100%	100.0%	0.0%	Pc.	-							1			30.0,0
1/2"	12.50		100%	100.0%	0.0%		- []							1			1
3/8"	9.50	100%	100%	100.0%	0.0%		40%										40.0%
1/4"	6.30		100%	100.0%	0.0%												1
#4	4.75	100%	100%	100.0%	0.0%									\			1
#8	2.36		100%	100.0%	0.0%		30%							H'	\ 		30.0%
#10	2.00	100%	100%	100.0%	0.0%		H								MIII		1
#16	1.18		100%	100.0%	0.0%		20%								IΝΠ		20.0%
#20	0.850		99%	100.0%	0.0%		20%								1		20.0%
#30	0.600		99%	100.0%	0.0%										*		1
#40	0.425	99%	99%	100.0%	0.0%		10%								ш	$\downarrow \downarrow$	10.0%
#50	0.300		99%	100.0%	0.0%											*	1
#60	0.250		98%	100.0%	0.0%												*
#80	0.180		98%	100.0%	0.0%		0%	100.000	10.000	- 404 	.000	-00-00-	100		1111111 10		.001
#100	0.150	98%	98%	100.0%	0.0%			100.000	10.000		.000	0.	100	0.0	710	U	.001
#140	0.106		95%	100.0%	0.0%				Parti	cle Size (mm)							
#170	0.090		93%	100.0%	0.0%												
#200	0.075	92.0%	92.0%	100.0%	0.0%	+ s	ieve Sizes		- Max Spec			Min Specs			Sieve R	esults	
		hnical Services PS, 1996-9	II .	100.070	3.070							.,					
				and ourselves, all reports are s	submitted as the confide	ntial property of clients, and	authorization	for publication	of statements,	conclusions	or extracts	from or reg	garding our i	reports is	reserved	pending ou	r written ap



Hydrometer Report

Project: Q.C Lower Duwamish Waterway Date Received: 29-Jul-21 Sampled By: Client Client Anchor QEA	Duoicata	O.C. Lavvan	Durramiah Wata	Doto Dogo	rode 20 Jul 21	Visual Identifie	ation	
Client: Anchor QEA Sample Color	•	-	Duwaiiisii wate				ation	
Sample ## B21-1430	,							
Assumed Sp Gr : 2.65 Sample Weight: 48.47 grams Forested Percent Soils Particle Sieve Passing Diameter 1.5" 1.00% 5.000 mm 1.5" 1.00% 3.1500 mm 3.4" 1.00% 3.1500 mm 3.4" 1.00% 3.1500 mm 3.4" 1.00% 3.1500 mm 3.5" 1.00% 3.1500 mm 3.4" 1.00% 3.1500 mm 3.5" 3.00%		•						
ASTM D7928, HYDROMETER ANALYSIS Assumed Sp Gr : 2.65 Sample Weight: 91.378% Adj. Sample Weight: 92.378% Adj. Sample Weight: 93.78% Adj. Sample Weight: 94.47 grams Hydrometer Reading Corrected Percent Soils Particle Minutes Reading Passing Diameter 1.25° 100% 50.000 mm 1 35 77.29% 0.0044 mm 2 30.5 62.99% 0.00326 mm 3 4 24.5 50.59% 0.0026 mm 4 24.5 50.59% 0.0026 mm 1 18.5 38.29% 0.0129 mm 1 18.5 30.99% 0.0093 mm 3 15 30.99% 0.0093 mm 4 24.5 5 50.59% 0.0093 mm 1 2 100% 15.000 mm 6 0 10.5 21.79% 0.0068 mm 1 4 4 0.5 5 10.33% 0.0055 mm 4 4 2.5 5 5.29% 0.0014 mm 5 8" 100% 12.500 mm 6 0 10.5 22.79% 0.0035 mm 1 4 140 2.5 5 5.29% 0.0014 mm 1 5 8 10.39% 0.0055 mm 1 4 140 2.5 5 10.39% 0.0093 mm 1 140 2.5 5 10.39% 0.0055 mm 1 140 2.5 5.29% 0.0014 mm 9 Gravel: 0.0% Liquid Limit: n/a Plastic Limit: n/a #40 99% 0.425 mm 9 Kandi: 8.0% Plastic Limit: n/a #40 99% 0.425 mm 9 Kandi: 8.0% Plastic Limit: n/a #40 99% 0.425 mm 9 Kandi: 8.0% Plastic Limit: n/a #40 99% 0.425 mm 9 Kandi: 8.0% Plastic Limit: n/a #40 99% 0.425 mm 9 Kandi: 8.0% Plastic Limit: n/a #40 99% 0.425 mm 9 Kandi: 8.0% Plastic Limit: n/a #40 99% 0.425 mm 1 100 98% 0.150 mm 1 100 98% 0.050 mm 1 100 99% 0.005 mm 1 100 90% 0.005 m			0-GB-14-19 ft	Tested	l By: A. Eifrig	brown		
Sample Weight: 2.65 Sample Weight: 50.30 grams	Sample#:	B21-1430						
Sample Weight:		ASTM D79	28, HYDROM	ETER ANALYSIS			ASTM 1	D6913
Hydroscopic Moist. 3,78%	Assumed Sp Gr :	2.65					Sieve Ar	nalysis
Adj. Sample Wgt	Sample Weight:	50.30	grams				Grain Size D	istribution
Adj. Sample Wgt 48.47 grams Cacrebite Certificate #: 1366.01 Size Passing Diameter 2.0" 100% 55.000 mm 100% 33.0" 100% 37.500 mm	Hydroscopic Moist.:	3.78%	-			Sieve	Percent	Soils Particle
Hydrometer Reading Corrected Percent Soils Particle 1.5" 100% 50.000 mm 1.2" 100% 37.500 mm 1.2" 100% 10.000 mm 1.2" 10.000 mm 10.	Adi. Sample Wgt :	48.47	grams		ACCREDITED	Size	Passing	Diameter
Reading	., F		8		Certificate #: 1366.01			75.000 mm
Reading	Hydrometer					2.0"	100%	50.000 mm
1 35	Reading	Corrected	Percent	Soils Particle		1.5"	100%	37.500 mm
2 30.5 62.9% 0.0326 mm 4 24.5 50.5% 0.0240 mm 15 18.5 38.2% 0.0129 mm 16 18.5 38.2% 0.0129 mm 17.2° 100% 12.500 mm 18 30 15 30.9% 0.0093 mm 18 378° 100% 9.500 mm 18 40 10.5 21.7% 0.0068 mm 18 100% 4.750 mm 19 100% 4.750 mm 19 10 100% 2.000 mm 19 10 100% 0.000 mm 19 10 100% 0.000 mm 10 100% 0.000 mm 10 100% 0.000 mm 10 100% 0.000 mm 11 10 100% 0.000 mm 12 10 100% 0.000 mm 12 10 100% 0.000 mm 13 18 10 100% 0.000 mm 14 10 100% 0.000 mm 14 10 100% 0.000 mm 15 10 100% 0.000 mm 16 10 100% 0.000 mm 17 10 100% 0.000 mm 18 10 100% 0.000 mm 19 10 100% 0.000 mm 19 10 100% 0.000 mm 10 100% 0.00	Minutes	Reading	Passing	Diameter		1.25"	100%	31.500 mm
4	1	35	72.2%	0.0444 mm		1.0"	100%	25.000 mm
15	2	30.5	62.9%	0.0326 mm		3/4"	100%	19.000 mm
30	4	24.5	50.5%	0.0240 mm		5/8"	100%	16.000 mm
1/4" 100% 6.300 mm 240 5	15	18.5	38.2%	0.0129 mm		1/2"	100%	12.500 mm
1440 2.5 5.2% 0.0014 mm	30	15	30.9%	0.0093 mm		3/8"	100%	9.500 mm
1440 2.5 5.2% 0.0014 mm #10 100% 2.000 mm #20 99% 0.850 mm #40 99% 0.425 mm #40 99% 0.425 mm #40 99% 0.150 mm #20 99% 0.150 mm #20 99% 0.150 mm #20 99.0% 0.150 mm #200 92.0% 0.075 mm #200 92.0% 0.005 mm 46.1% 0.020 mm 46.1% 0.005 mm 46.0% 0.000 mm 46.0% 0	60	10.5	21.7%	0.0068 mm		1/4"	100%	6.300 mm
% Gravel: 0.0% Liquid Limit: n/a #40 99% 0.850 mm % Sand: 8.0% Plastic Limit: n/a #100 98% 0.125 mm % Silt: 76.4% Plasticity Index: n/a #200 92.0% 0.075 mm % Clay: 15.6% Plasticity Index: n/a #200 92.0% 0.075 mm % Clay: 15.6% 0.002 mm Clays 15.6% 0.005 mm 46.1% 0.020 mm Clays 15.6% 0.002 mm Colloids 3.6% 0.001 mm Clays 15.6% 0.002 mm Colloids 3.6% 0.001 mm USDA Soil Textural Classification #200 99% 0.850 mm #200 92.0% 0.150 mm 80.4% 0.050 mm Clays 15.6% 0.002 mm Clays 15.6% 0.002 mm Colloids 3.6% 0.002 mm Colloids 3.6% 0.001 mm W Silt: 0.05 - 0.002 mm % Silt: 0.05 - 0.002 mm W Silt: 0.05 - 0.002 mm % Silt: 0.05 - 0.002 mm % Silt: 0.05 - 0.002 mm W Silt: 0.05 - 0.002 mm % Silt: 0.05 - 0.002 mm % Silt: 0.05 - 0.002 mm % Silt: 0.05 - 0.002 mm W Silt: 0.05 - 0.002 mm	240	5	10.3%	0.0035 mm		#4	100%	4.750 mm
We Gravel: 0.0% Liquid Limit: n/a	1440	2.5	5.2%	0.0014 mm		#10	100%	2.000 mm
% Sand: 8.0% Plastic Limit: n/a #100 98% 0.150 mm % Silt: 76.4% Plasticity Index: n/a #200 92.0% 0.075 mm % Clay: 15.6% Plasticity Index: n/a #200 92.0% 0.075 mm 80.4% 0.050 mm 46.1% 0.020 mm Clays 15.6% 0.005 mm 6.6% 0.002 mm Colloids 3.6% 0.001 mm Colloids 3.6% 0.001 mm **Colloids 3.6% 0.001 mm **Colloids 3.6% 0.001 mm **Colloids 3.6% 0.002 mm **Colloids 3.6% 0.001 mm **Colloids 3.6% 0.002 mm **Colloids 3.6% 0.001 mm **Co						#20	99%	0.850 mm
We Silt: 76.4% Plasticity Index: n/a #200 92.0% 0.075 mm	% Gravel:	0.0%		Liquid Limit: n/a		#40	99%	0.425 mm
% Clay: 15.6% % Clay: 15.6% Silts 91.4% 0.074 mm 80.4% 0.050 mm 46.1% 0.020 mm Clays 15.6% 0.005 mm 6.6% 0.002 mm Clays 15.6% 0.001 mm Clays 15.6% 0.002 mm Colloids 3.6% 0.001 mm Colloids 3.6% 0.001 mm WSDA Soil Textural Classification Particle Size 2.0 - 0.05 mm 9% Silt: 0.05 - 0.002 mm 9% Clay: < 0.002 mm WSDA Soil Textural Classification Silt Loam WSDA Soil Textural Classification Silt Loam	% Sand:	8.0%		Plastic Limit: n/a		#100	98%	0.150 mm
Solit Soli	% Silt:	76.4%		Plasticity Index: n/a		#200	92.0%	0.075 mm
USDA Soil Textural Classification Particle Size 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: (0.005 mm 0.000 mm 0.	% Clay:	15.6%				Silts	91.4%	0.074 mm
Clays 15.6% 0.005 mm 6.6% 0.002 mm Colloids 3.6% 0.001 mm USDA Soil Textural Classification Particle Size 9. Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification USDA Soil Textural Classification Silt Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.								
USDA Soil Textural Classification Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification USDA Soil Textural Classification USDA Soil Textural Classification Silt Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.							46.1%	
USDA Soil Textural Classification Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification Silt Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.						Clays		
USDA Soil Textural Classification Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification Silt Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.								
Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification Silt Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.						Colloids	3.6%	0.001 mm
Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification Silt Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.								
Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification Silt Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.								
% Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification Silt Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.		USDA	Soil Textural	Classification				
% Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification Silt Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.			Doutiele Cire					
% Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification Silt Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.	% Sand.							
% Clay: < 0.002 mm USDA Soil Textural Classification Silt Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.								
USDA Soil Textural Classification Silt Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.								
Silt Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.	70 Clay.		(0.002 mm					
Silt Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.		HEDA	Soil Textural	Classification				
All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.		USDA		Classification				
regarding our reports is reserved pending our written approval.			on Loan					
regarding our reports is reserved pending our written approval.	All results apply only to actual location	ons and materials tested	As a mutual protection to	clients, the public and ourselves, all reno	orts are submitted as the confidentia	I property of clients, and out	horization for publication of	statements, conclusions or extracts from or
Comments:				, p outserves, all repe	us the comments	1 F J Smontes, and date	publication of	-,
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	Comments:							

Environmental • Geotechnical Engineering • Special Inspection • Non-Destructive Testing • Materials Testing

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360.755.1990

www.mtc-inc.net

Reviewed by:

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1430
Sample Date:	7/7/2021
Test Date:	9/20/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT10-GB-14-19 ft

 Visual Soil Description:
 brown clayey silt

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

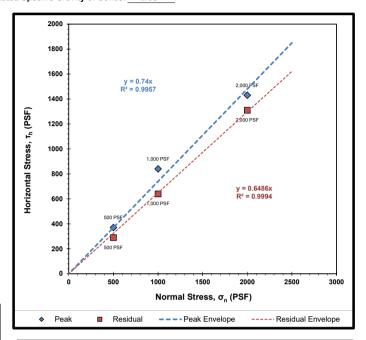
Specimen Height (in): 1
Rate of Strain (in/min): 0.0042
Estimated Specific Gravity of Solids: 2.65

Summary of Sample	e Data:	σ _n =500 PSF
Initial Moisture Content (%):	45.3	
	Initial	Post-Consolidation
Dry Density (PCF):	91.7	95.2
Void Ratio:	0.837	0.770
Porosity (%):	45.6	43.5
Degree of Saturation (%):	saturated	saturated

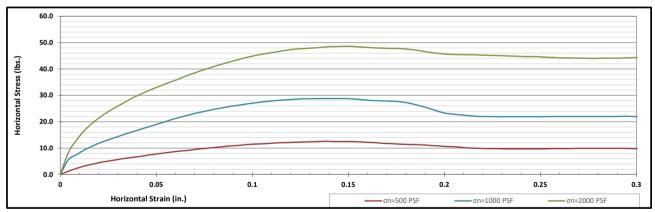
Summary of Sample	Data:	σ _n =1000 PSF
Initial Moisture Content (%):	40.4	
	Initial	Post-Consolidation
Dry Density (PCF):	95.4	102.4
Void Ratio:	0.765	0.646
Porosity (%):	43.4	39.3
Degree of Saturation (%):	saturated	saturated

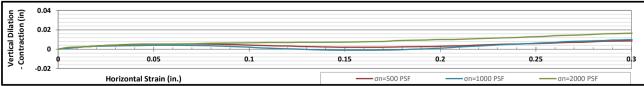
Summary of Sample	e Data:	σ _n =2000 PSF
Initial Moisture Content (%):	37.0	
	Initial	Post-Consolidation
Dry Density (PCF):	97.7	106.6
Void Ratio:	0.725	0.581
Porosity (%):	42.0	36.7
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS							
PEAK RESIDUAL							
Angle of Internal Friction, φ (°):	37	33					
Cohesion (PSF):	0	0					



Failure Envelope Test Values:						
Normal Stress, σ _n (PSF):	500	1000	2000			
Peak Horizontal Stress, τ _h (PSF):	370	840	1430			
Residual Horizontal Stress, τ _h (PSF):	290	640	1310			





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT10-GB-19-24 ft

Sample#: B21-1431

#140

#170

#200

0.106

0.090

0.075

27.5%

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 23-Aug-21 Tested By: A. Eifrig

Unified Soils Classification System, ASTM D-2487

SM, Silty Sand Sample Color: grayish-brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Space

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASTM D43} \\ \textbf{D}_{(5)} = 0.014 \\ \textbf{D}_{(10)} = 0.027 \\ \textbf{D}_{(15)} = 0.041 \\ \textbf{D}_{(30)} = 0.079 \\ \textbf{D}_{(50)} = 0.108 \\ \textbf{D}_{(60)} = 0.122 \\ \textbf{D}_{(90)} = 0.298 \end{array}$ mm % Gravel = 0.0% % Sand = 72.5% mm % Silt & Clay = 27.5% mm mm Liquid Limit = n/a mm Plasticity Index = n/amm

Sand Equivalent = n/a Fracture %, 1 Face = n/a aces = n/a Coeff. of Curvature, $C_C = 1.85$ Coeff. of Uniformity, $C_U = 4.47$ Fineness Modulus = 0.32 Plastic Limit = n/a

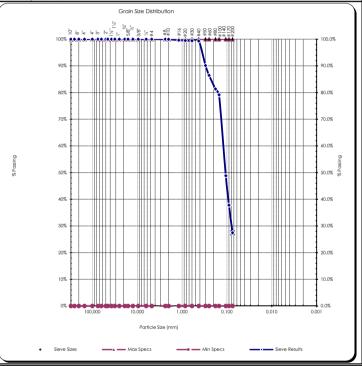
Moisture %, as sampled = 35.1% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

						$D_{(90)} = 0.298$	mm		racture %	
						ust Ratio = 13/47	~	Frac	cture %, 2	2+ Fac
		Actual Cumulative	Interpolated Cumulative	AS	TM C136, AS	TM D6913, ASTM			Grain Size [
Sieve	Size	Percent	Percent	Specs	Specs			2	3/8'	
US	Metric	Passing	Passing	Max	Min	10	₽ 0 0 0 2 •=•••• 100	: 월 10 년 : : 40 00 00 0 0 00 00 00 00 00 00 00 00 00 0	- % % ≥	***
12.00"	300.00		100%	100.0%	0.0%		T			M
10.00"	250.00		100%	100.0%	0.0%					
8.00"	200.00		100%	100.0%	0.0%	9	0%			
6.00"	150.00		100%	100.0%	0.0%					
4.00"	100.00		100%	100.0%	0.0%					
3.00"	75.00		100%	100.0%	0.0%	8	0%			Ш
2.50"	63.00		100%	100.0%	0.0%					
2.00"	50.00		100%	100.0%	0.0%	7	0%			Щ.
1.75"	45.00		100%	100.0%	0.0%					
1.50"	37.50		100%	100.0%	0.0%					
1.25"	31.50		100%	100.0%	0.0%	6	0%			
1.00"	25.00	100%	100%	100.0%	0.0%	2				
3/4"	19.00	100%	100%	100.0%	0.0%	Possing 2	0%			
5/8"	16.00		100%	100.0%	0.0%	96	176			
1/2"	12.50	100%	100%	100.0%	0.0%					
3/8"	9.50	100%	100%	100.0%	0.0%	4	0%	ш.		Ш.
1/4"	6.30		100%	100.0%	0.0%					
#4	4.75	100%	100%	100.0%	0.0%					
#8	2.36		100%	100.0%	0.0%	3	10%	####		###
#10	2.00	100%	100%	100.0%	0.0%					
#16	1.18		100%	100.0%	0.0%		0%			
#20	0.850		99%	100.0%	0.0%		×			
#30	0.600		99%	100.0%	0.0%					
#40	0.425	99%	99%	100.0%	0.0%	1	0%	+++++		
#50	0.300		90%	100.0%	0.0%					
#60	0.250		86%	100.0%	0.0%					
#80	0.180		81%	100.0%	0.0%		0% 000 0 100.	.000	10.000	-
#100	0.150	79%	79%	100.0%	0.0%					

100.0%

100.0%

100.0%



0.0%

0.0%

0.0%

Comments: Reviewed by: Meghan Blodgett-Carrillo

49%

38%

27.5%



Visual Identification Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Clay with Silt Sampled By: Client **Project #:** 21B233 Date Tested: 25-Aug-21 Client: Anchor QEA Sample Color Source: LDW21-GT28-GB-0-10 ft Tested By: A. Eifrig dark brown Sample #: B21-1434 **Liquid Limit Determination** Weight of Wet Soils + Pan: 33.52 24.84 28.54 Weight of Dry Soils + Pan: 28.91 21.54 25.61 Weight of Pan: 19 45 14 96 19 90 Liquid Limit @ 25 Blows: Weight of Dry Soils: 9.46 6.58 5.71 Plastic Limit: Plasticity Index, I_P: Weight of Moisture: % Moisture: 4.61 3 30 2 93 N/A 48.7 % 50.2 % 51.3 % N/A Number of Blows: **Plastic Limit Determination** #2 Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Plastic limit cannot be determined Weight of Pan: Weight of Dry Soils: Weight of Moisture: % Moisture: **Plasticity Chart Liquid Limit** 80.0 % 100% 70.0 % 90% 60.0 % A" Line Plasticity Index 50.0 % 60% 40.0 % 50% 30.0 % CL or OL MH or OH 20% 10.0 % ML or OL 10% 100% 10 100 **Liquid Limit** Copyright Spears Engineering & Technical Services PS, 1996-98

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our

Comments: Plastic Limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Visual Identification Sampled By: Client **Project #:** 21B233 Silty Clay Sample Color Date Tested: 25-Aug-21 Client: Anchor QEA Source: LDW21-GT28-GB-10-15 ft Tested By: A. Eifrig dark brown Sample #: B21-1436 **Liquid Limit Determination** Weight of Wet Soils + Pan: 30.19 32.21 Weight of Dry Soils + Pan: 26.52 27.44 27.75 Weight of Pan: 19 62 19 54 19.84 Liquid Limit @ 25 Blows: Weight of Dry Soils: 6.90 7.90 7.91 Plastic Limit: Plasticity Index, I_P: Weight of Moisture: % Moisture: 3 67 4 24 4 46 N/A 56.4 % 53.2 % 53.7 % N/A Number of Blows: **Plastic Limit Determination** #2 Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Plastic limit cannot be determined Weight of Pan: Weight of Dry Soils: Weight of Moisture: % Moisture: **Plasticity Chart Liquid Limit** 80.0 % 100% 70.0 % 90% 60.0 % A" Line Plasticity Index 50.0 % 60% 40.0 % 50% 30.0 % CL or OL MH or OH 20% 10.0 % ML or OL 10% 100% 10 100 **Liquid Limit** Copyright Spears Engineering & Technical Services PS, 1996-98

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Comments: Plastic Limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Visual Identification Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Sampled By: Client Clay and Silt **Project #:** 21B233 Date Tested: 25-Aug-21 Client: Anchor QEA Sample Color Source: LDW21-GT28-GB-15-16.8 ft Tested By: A. Eifrig dark brown Sample #: B21-1437 **Liquid Limit Determination** Weight of Wet Soils + Pan: 31.73 40.08 39.56 Weight of Dry Soils + Pan: 28.13 36.32 36.04 Weight of Pan: 28 17 28 53 19.86 Liquid Limit @ 25 Blows: Weight of Dry Soils: 8.27 8.15 7.51 Plastic Limit: Plasticity Index, I_P: Weight of Moisture: % Moisture: 3.60 3.76 3 52 N/A 46.9 % 43.5 % 46.1 % N/A Number of Blows: **Plastic Limit Determination** #2 Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Plastic limit cannot be determined Weight of Pan: Weight of Dry Soils: Weight of Moisture: % Moisture: **Plasticity Chart Liquid Limit** 80.0 % 100% 70.0 % 90% 60.0 % A" Line Plasticity Index 50.0 % 60% 40.0 % 50% 30.0 % CL or OL MH or OH 20% 10.0 % ML or OL 10% 100% 10 100 **Liquid Limit** Copyright Spears Engineering & Technical Services PS, 1996-98

variesturs apply only to extent notations and materials existed. As a material resisted in the control of the c

Comments: Plastic Limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT28-GB-16.8-20 ft

Sample#: B21-1438

#140

#170

#200

0.106

0.090

0.075

Meghan Blodgett-Carrillo

3.8%

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 23-Aug-21

Tested By: A. Eifrig

Unified Soils Classification System, ASTM D-2487

SP, Poorly graded Sand

Sample Color:

gray



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs Sample Meets Specs? N/A

8%

6%

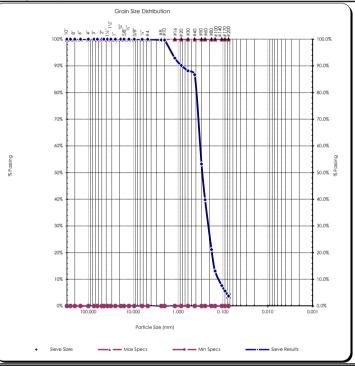
3.8%

 $\begin{array}{l} \textbf{ASIM D43} \\ \textbf{D}_{(5)} = 0.085 \\ \textbf{D}_{(10)} = 0.125 \\ \textbf{D}_{(15)} = 0.157 \\ \textbf{D}_{(30)} = 0.213 \\ \textbf{D}_{(50)} = 0.288 \\ \textbf{D}_{(60)} = 0.325 \\ \textbf{D}_{(90)} = 0.827 \\ \textbf{D}_{(90)} = 0.828 \\ \textbf{$ mm % Gravel = 0.0% % Sand = 96.2% mm % Silt & Clay = 3.8% mm mm Liquid Limit = n/a mm Plasticity Index = n/a mm Sand Equivalent = n/a mm Fracture %, 1 Face = n/aaces = n/a

Coeff. of Curvature, $C_C = 1.12$ Coeff. of Uniformity, $C_U = 2.60$ Fineness Modulus = 1.53 Plastic Limit = n/a Moisture %, as sampled = 29.7%

Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

					_	D(90) - 0.027	111111	_		0/ 2	
						ast Ratio = 1/23		F	ractur	e %, 2-	+ Fa
				AS	TM C136, AST	TM D6913, ASTM	C117				
		Actual	Interpolated						Grain	n Size Dis	stribut
		-	Cumulative						Ę.		
	e Size	Percent	Percent	Specs	Specs		b in	N 44 9	,	8	4 00
US	Metric	Passing	Passing	Max	Min	1	100%		****	•	أجرا
12.00"	300.00		100%	100.0%	0.0%						
10.00"	250.00		100%	100.0%	0.0%						
8.00"	200.00		100%	100.0%	0.0%		90%				\top
6.00"	150.00		100%	100.0%	0.0%						
4.00"	100.00		100%	100.0%	0.0%		80%				Ш
3.00"	75.00		100%	100.0%	0.0%						
2.50"	63.00		100%	100.0%	0.0%		- 1				
2.00"	50.00		100%	100.0%	0.0%		70%				+
1.75"	45.00		100%	100.0%	0.0%						
1.50"	37.50		100%	100.0%	0.0%						
1.25"	31.50		100%	100.0%	0.0%		60%				++-
1.00"	25.00	100%	100%	100.0%	0.0%	D _L					
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	50%				
5/8"	16.00		100%	100.0%	0.0%	P6	50%				
1/2"	12.50	100%	100%	100.0%	0.0%						
3/8"	9.50	100%	100%	100.0%	0.0%		40%				
1/4"	6.30		100%	100.0%	0.0%						
#4	4.75	100%	100%	100.0%	0.0%						
#8	2.36		100%	100.0%	0.0%		30%				++
#10	2.00	100%	100%	100.0%	0.0%		H				
#16	1.18		93%	100.0%	0.0%		20%				
#20	0.850		90%	100.0%	0.0%		20%				TT
#30	0.600		88%	100.0%	0.0%						
#40	0.425	87%	87%	100.0%	0.0%		10%				4
#50	0.300		53%	100.0%	0.0%						
#60	0.250		40%	100.0%	0.0%						
#80	0.180		21%	100.0%	0.0%		0%	100.000	000-00	10.000	-
#100	0.150	13%	13%	100.0%	0.0%			. 20.000			
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Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1438
Sample Date:	7/7/2021
Test Date:	8/25/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT28-GB-16.8-20 ft

 Visual Soil Description:
 gray sand

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

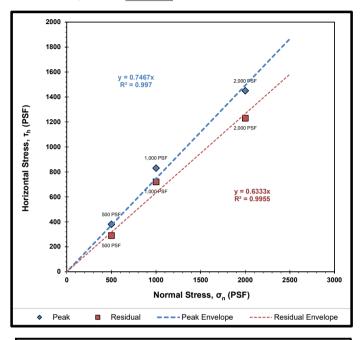
Specimen Height (in): 1
Rate of Strain (in/min): 0.0208
Estimated Specific Gravity of Solids: 2.65

Summary of Sample	σ _n =500 PSF	
Initial Moisture Content (%):	31.3	
	Initial	Post-Consolidation
Dry Density (PCF):	105.4	106.7
Void Ratio:	0.598	0.579
Porosity (%):	37.4	36.7
Degree of Saturation (%):	saturated	saturated

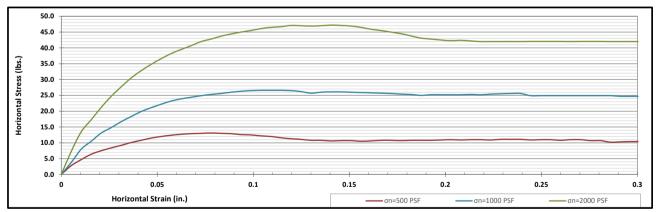
Summary of Sample	σ _n =1000 PSF	
Initial Moisture Content (%):	31.0	
	Initial	Post-Consolidation
Dry Density (PCF):	105.6	107.2
Void Ratio:	0.595	0.572
Porosity (%):	37.3	36.4
Degree of Saturation (%):	saturated	saturated

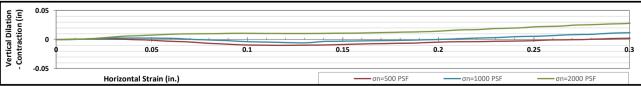
Summary of Samp	σ _n =2000 PSF	
Initial Moisture Content (%):	32.9	
	Initial	Post-Consolidation
Dry Density (PCF):	104.0	107.8
Void Ratio:	0.619	0.562
Porosity (%):	38.2	36.0
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS							
PEAK RESIDUAL							
Angle of Internal Friction, φ (°):	37	32					
Cohesion (PSF):	0	0					



Failure Envelope Test Values:							
Normal Stress, σ _n (PSF): 500 1000 2000							
Peak Horizontal Stress, τ _h (PSF):	380	830	1450				
Residual Horizontal Stress, τ _h (PSF):	290	720	1230				





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Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Visual Identification Sampled By: Client **Project #:** 21B233 Silty Clay Sample Color Date Tested: 25-Aug-21 Client: Anchor QEA Source: LDW21-GT21-GB-0-13 ft Tested By: A. Eifrig dark brown Sample #: B21-1441 **Liquid Limit Determination** Weight of Wet Soils + Pan: 28.39 31.98 25.34 Weight of Dry Soils + Pan: 23 97 27.63 21.68 Weight of Pan: 15.01 19 45 14 80 Liquid Limit @ 25 Blows: Weight of Dry Soils: 8.96 8.18 6.88 52 % Plastic Limit: Plasticity Index, I_P: Weight of Moisture: % Moisture: 4 42 435 3 66 N/A 53.2 % 49.3 % 53.2 % N/A Number of Blows: **Plastic Limit Determination** #2 Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Plastic limit cannot be determined Weight of Pan: Weight of Dry Soils: Weight of Moisture: % Moisture: **Plasticity Chart Liquid Limit** 80.0 % 100% 70.0 % 90% 60.0 % A" Line Plasticity Index 50.0 % 60% 40.0 % 50% 30.0 % CL or OL MH or OH 20% 10.0 % ML or OL 10% 100% 10 100 **Liquid Limit** Copyright Spears Engineering & Technical Services PS, 1996-98

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our

Comments: Plastic Limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT21-GB-13-16 ft

Sample#: B21-1442

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 23-Aug-21 Tested By: A. Eifrig

Unified Soils Classification System, ASTM D-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{c} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.017 \\ \textbf{D}_{(10)} = 0.034 \\ \textbf{D}_{(15)} = 0.051 \\ \textbf{D}_{(30)} = 0.096 \\ \textbf{D}_{(50)} = 0.150 \\ \textbf{D}_{(60)} = 0.239 \\ \textbf{D}_{(90)} = 1.216 \\ \textbf{Ratio} = 3/11 \\ \end{array}$ mm % Gravel = 0.2% % Sand = 77.9% mm % Silt & Clay = 22.0% mm mm Liquid Limit = n/a Plasticity Index = n/a mm Sand Equivalent = n/a

mm Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 1.14$ Coeff. of Uniformity, $C_U = 7.00$ Fineness Modulus = 1.12

Plastic Limit = n/a Moisture %, as sampled = 96.5% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face =

		Actual	Interpolated	AS	STM C136, AST	M 50713, ASI	141 C11 /												
			Cumulative			ľ			Gi	rain Size	Distribut	tion							
Sieve	Size	Percent	Percent	Specs	Specs				12.2	a. Sa .			_	00	00				
US	Metric	Passing	Passing	Max	Min		100% ●●	0 6 4 6	, 5≥ = <u>.</u>	3/8	γ ≑ ±	2 2 2	8 4 4 9	8888	82				 100.0
12.00"	300.00	rassing	100%	100.0%	0.0%		100%							1111		T		П	T 100.0
10.00"	250.00		100%	100.0%	0.0%		-					$ \setminus $							1
8.00"	200.00		100%	100.0%	0.0%		90%				###	11		<u> </u>		4-4-			90.09
6.00"	150.00		100%	100.0%	0.0%							N							1
4.00"	100.00		100%	100.0%	0.0%		t						N.						1
3.00"	75.00		100%	100.0%	0.0%		80%				+++	+-+	₩Ì			++-		-	80.09
2.50"	63.00		100%	100.0%	0.0%		ł						 						1
2.00"	50.00		100%	100.0%	0.0%		70%												70.09
1.75"	45.00		100%	100.0%	0.0%		/0/0 F												1,0.09
1.50"	37.50		100%	100.0%	0.0%		- 1							١					1
1.25"	31.50		100%	100.0%	0.0%		60%	+-++			+++	+-+	₩₩	1		+		++-	60.09
1.00"	25.00	100%	100%	100.0%	0.0%	p p								١ ١					1
3/4"	19.00	100%	100%	100.0%	0.0%	% Possing	ļ.							l N					1
5/8"	16.00		100%	100.0%	0.0%	₩.	50%	+			###	+	###	1		++-	111111	++-	50.09
1/2"	12.50	100%	100%	100.0%	0.0%		1												1
3/8"	9.50	100%	100%	100.0%	0.0%		40%				Ш		ШШ				ШШ		40.09
1/4"	6.30		100%	100.0%	0.0%		.5,0												1
#4	4.75	100%	100%	100.0%	0.0%		-												1
#8	2.36		99%	100.0%	0.0%		30%	$- \parallel$			+++	+-+			\	+		++-	30.09
#10	2.00	99%	99%	100.0%	0.0%		ļ								ì				1
#16	1.18		90%	100.0%	0.0%		- 1								1				1
#20	0.850		86%	100.0%	0.0%		20%				†††	+	mm			11	111111	11	20.09
#30	0.600		83%	100.0%	0.0%														1
#40	0.425	81%	81%	100.0%	0.0%		10%				444	$\perp \perp \parallel$	Ш	<u> </u>	ШШ		4444		10.09
#50	0.300	****	67%	100.0%	0.0%														1
#60	0.250		61%	100.0%	0.0%		ł												1
#80	0.180		53%	100.0%	0.0%		0%	100.00	is debaded	10.000		1.00		00-00-0	100		.010	ш.	0.0%
#100	0.150	50%	50%	100.0%	0.0%			100.00		10.000		1.00		0.1	100	U.	.010		0.001
#140	0.106	****	34%	100.0%	0.0%					Pa	rticle Size	(mm)							
#170	0.090		28%	100.0%	0.0%														
#200	0.075	22.0%	22.0%	100.0%	0.0%		Sieve Sizes			- Max Spe	ecs	_	N	nin Specs			Sieve F	esults	
Copyright		ļ	1	2.03.070	2.070	<u> </u>				-,-									

Reviewed by: _



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

#100

#140

#170

#200

Reviewed by:

0.150

0.106

0.090

0.075

19.4%

Meghan Blodgett-Carrillo

Source: LDW21-GT21-GB-16-21 ft Sample#: B21-1444

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 23-Aug-21 Tested By: A. Eifrig

Unified Soils Classification System, ASTM D-2487

SM, Silty Sand Sample Color: dark gray



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASTM D43} \\ \textbf{D}_{(5)} = 0.019 \\ \textbf{D}_{(10)} = 0.039 \\ \textbf{D}_{(15)} = 0.058 \\ \textbf{D}_{(30)} = 0.104 \\ \textbf{D}_{(50)} = 0.177 \\ \textbf{D}_{(60)} = 0.256 \\ \textbf{D}_{(90)} = 1.188 \end{array}$ mm % Gravel = 0.1% % Sand = 80.5% mm % Silt & Clay = 19.4% mm mm Liquid Limit = n/a mm Plasticity Index = n/a mm Sand Equivalent = n/a mm

Fracture %, 1 Face = n/a = n/a Coeff. of Curvature, $C_C = 1.10$ Coeff. of Uniformity, $C_U = 6.61$ Fineness Modulus = 1.15 Plastic Limit = n/a

Moisture %, as sampled = 38.7% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

							$D_{(90)} = 1.188$	mn			ture %,		
							Oust Ratio = 5/21			Fractur	re %, 2-	+ Fac	es=
					AS	STM C136, AS	TM D6913, ASTM	I C117					
			Actual	Interpolated			ľ			Gra	in Size Dis	stributic	on
			1	Cumulative						Ę.,			
	Sieve		Percent	Percent	Specs	Specs		į,	p & 4 4 9 6	N %	§ \$ 4.2	. ∞ <u>C</u>	9 9
	US	Metric	Passing	Passing	Max	Min	4	100%				-	-
	2.00"	300.00		100%	100.0%	0.0%		ł					Λ
- 11	0.00"	250.00		100%	100.0%	0.0%							\
	3.00"	200.00		100%	100.0%	0.0%		90%				+	1
	5.00"	150.00		100%	100.0%	0.0%		1					
	1.00"	100.00		100%	100.0%	0.0%		80%				444	ļ
	3.00"	75.00		100%	100.0%	0.0%							
	2.50"	63.00		100%	100.0%	0.0%		ŀ					
	2.00"	50.00		100%	100.0%	0.0%		70%				+	
	1.75"	45.00		100%	100.0%	0.0%		- 1					
	1.50"	37.50		100%	100.0%	0.0%		ļ					
1	1.25"	31.50		100%	100.0%	0.0%		60%	+	HHH		+++	
1	.00"	25.00	100%	100%	100.0%	0.0%	<u>0</u>	t					
	3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	50%					
	5/8"	16.00		100%	100.0%	0.0%	₽6	50%					
	1/2"	12.50	100%	100%	100.0%	0.0%		F					
	3/8"	9.50	100%	100%	100.0%	0.0%		40%				+	
	1/4"	6.30		100%	100.0%	0.0%		1					
	#4	4.75	100%	100%	100.0%	0.0%		1					
	#8	2.36		99%	100.0%	0.0%		30%	+-+++	++-		+++	
	#10	2.00	99%	99%	100.0%	0.0%		Ł					
	#16	1.18		90%	100.0%	0.0%		20%					
	#20	0.850		86%	100.0%	0.0%		20% T					
	#30	0.600		83%	100.0%	0.0%		- 1					
	#40	0.425	81%	81%	100.0%	0.0%		10%		444		444	<u> </u>
	#50	0.300		66%	100.0%	0.0%		ļ					
	#60	0.250		59%	100.0%	0.0%		1					
	#80	0.180		50%	100.0%	0.0%		0%	100.000	1000000	10.000	-	1.0
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100.0%

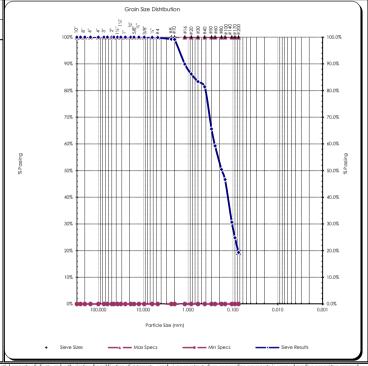
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47%

31%

25%

19.4%



Comments:			
	Nagh Chilget arillo		

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Environmental • Geotechnical Engineering • Special Inspection • Non-Destructive Testing • Materials Testing Burlington | Olympia | Bellingham | Silverdale | Tukwila 360.755.1990 www.mtc-inc.net

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1444
Sample Date:	7/8/2021
Test Date:	9/13/2021
Technician:	M. Carrillo

Sample Source: LDW21-GT21-GB-16-21 ft
Visual Soil Description: dark gray sand
Type of Specimen: Remolded Cylindrical Shear Box

2.65

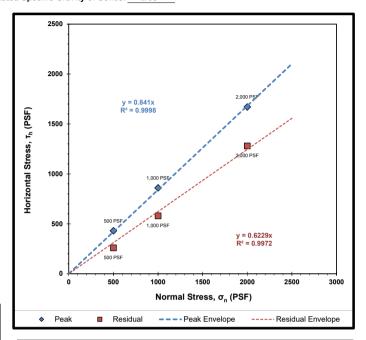
Estimated Specific Gravity of Solids:

Summary of Sample	Data:	σ _n =500 PSF
Initial Moisture Content (%):	26.8	
	Initial	Post-Consolidation
Dry Density (PCF):	107.5	109.1
Void Ratio:	0.568	0.545
Porosity (%):	36.2	35.3
Degree of Saturation (%):	saturated	saturated

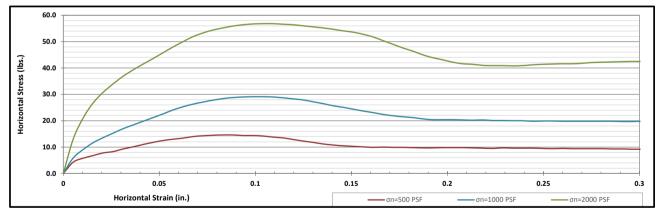
Summary of Sampl	e Data:	σ _n =1000 PSF				
Initial Moisture Content (%):	26.2					
	Initial	Post-Consolidation				
Dry Density (PCF):	107.6	110.8				
Void Ratio:	0.566	0.521				
Porosity (%):	36.1	34.3				
Degree of Saturation (%):	saturated	saturated				

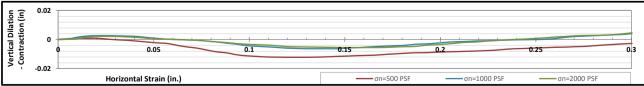
Summary of Samp	le Data:	σ _n =2000 PSF				
Initial Moisture Content (%):	24.9					
	Initial	Post-Consolidation				
Dry Density (PCF):	108.8	113.7				
Void Ratio:	0.549	0.481				
Porosity (%):	35.4	32.5				
Degree of Saturation (%):	saturated	saturated				

ESTIMATED STRENGTH PARAMETERS									
	PEAK	RESIDUAL							
Angle of Internal Friction, φ (°):	40	32							
Cohesion (PSF):	0	0							



Failure Envelope Test Values:									
Normal Stress, σ _n (PSF):	500	1000	2000						
Peak Horizontal Stress, τ _h (PSF):	430	860	1670						
Residual Horizontal Stress, τ _h (PSF):	260	580	1280						





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT21-GB-21-25.7 ft

Sample#: B21-1445

Comments:

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 23-Aug-21

Tested By: A. Eifrig

Visual Identification Sandy Silt

mm

Sample Color: grayish-brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

5	specifications
	No Casoo

No Specs

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D43I} \\ \textbf{D}_{(5)} = 0.005 \\ \textbf{D}_{(10)} = 0.010 \\ \textbf{D}_{(15)} = 0.015 \\ \textbf{D}_{(30)} = 0.040 \\ \textbf{D}_{(50)} = 0.060 \\ \textbf{D}_{(60)} = 0.068 \\ \textbf{D}_{(90)} = 0.130 \\ \textbf{Partice} = 16/23 \\ \end{array}$ mm % Gravel = 0.0%% Sand = 30.5% mm % Silt & Clay = 69.5% mm mm Liquid Limit = n/a Plasticity Index = n/amm

Sand Equivalent = n/a Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 2.30$ Coeff. of Uniformity, $C_U = 6.70$ Fineness Modulus = 0.04

Plastic Limit = n/a Moisture %, as sampled = 35.7% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face =

					Ratio = $16/23$				ture %	, 2+ F	aces =	n/a]	Req'd	Frac	ture (%, 2+	Face	s =
				ASTM C136,	ASTM D6913, A	STM	C117													
	Actual	Interpolated						(Grain Size	e Distrib	ution									
		Cumulative	_	_				5.												
Sieve Size	Percent	Percent	Specs	Specs			4.60	: 2 s	5/8".	÷ 4	ep⊇ ≤	88	8 8 8 8	8888	8					
US Metric	Passing	Passing	Max	Min	1009			(0.00	****	•		1919	-	-	•	TT		TTT	Т	100.0%
12.00" 300.00		100%	100.0%	0.0%										"ì II					1 }	
10.00" 250.00		100%	100.0%	0.0%										1 11						
8.00" 200.00		100%	100.0%	0.0%	909			TT				Ш	111	111	m	TT		111	1 1	90.0%
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4.00" 100.00		100%	100.0%	0.0%	809							ШШ			Ш					80.0%
3.00" 75.00		100%	100.0%	0.0%		H								N					1	
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1.50" 37.50		100%	100.0%	0.0%																
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3/4" 19.00		100%	100.0%	0.0%	Di	H													1	50.0%
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1/2" 12.50		100%	100.0%	0.0%																
3/8" 9.50	100%	100%	100.0%	0.0%	409	1		444			_		+						11	40.0%
1/4" 6.30		100%	100.0%	0.0%											11/11				1	
#4 4.75	100%	100%	100.0%	0.0%											*					
#8 2.36		100%	100.0%	0.0%	309	+		+++	-				+++		₩	++-		+++-	 	30.0%
#10 2.00	100%	100%	100.0%	0.0%		1									$ \setminus$				1	
#16 1.18		100%	100.0%	0.0%	000											M			1 }	00.00
#20 0.850		100%	100.0%	0.0%	209											*				20.0%
#30 0.600		100%	100.0%	0.0%												$ \rangle$			1	
#40 0.425	100%	100%	100.0%	0.0%	109	1		444	ļļ				444		Ш.	ļ	λ	444	1	10.0%
#50 0.300		99%	100.0%	0.0%													-I N			
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#140 0.106	2,7,0	81%	100.0%	0.0%					F	Particle Si	ze (mm)									
#170 0.090		75%	100.0%	0.0%																
#200 0.075	69.5%	69.5%	100.0%	0.0%	+ Sieve	Sizes			- Max Si	pecs	_		- Min S	pecs			Sie	ve Result	s	
	Fechnical Services PS, 1996-	1	100.070	0.070	. 51010												2.0			

	1 - 22 1.11	
Reviewed by:	Magh Balget and lo	
	Maghan Bladgatt Carrilla	



Hydrometer Report

Project: QC Lower Dawamish Waterway Date Receivet: 29-Iu-21 Sampled By: Client Angle By: Client	Project:	O.C Lower	Duwamich Waterw	yay Data Racai	ved: 29-Jul-21	Visual Identific	ention	
Client : Anchor QEA Source : LDW2 L2F3 GB-21-25.7 ft Tested By: A. Eifrig Grayish-brown		-	Duwaiiiisii wateiw	•			ation	
Sample# B21-1445 Sp Gr : Size Size								
ASTM D7928, HYDROMETER ANALYSIS Sieve Analysis Siev			1 CD 21 25 7 0			•		
ASTM D7928, HVDROMETER ANALYSIS Spars Size Analysis Size Care Size Size Care Analysis Size Care Analys			I-GB-21-25./ π	1 estea	By: A. Ellrig	grayisn-brown		
Sample Weight 10.072%			20 HVDDOME		ACTIMA	0.6012		
Sample Weight:			28, HYDKOME	IEK ANALYSIS				
Hydroscopic Moist.: 0.72% Adj. Sample Wg: 50.70 grams			ama ma					•
Adj. Sample Wgt 50.70 grams Cacretical Certificate #: 1366.01 Size Passing Diameter 1.00% 50.000 mm 100% 50.000 mm 100% 37.500 mm 30.000 mm 30.0000 mm 30.0000 mm 30.0000 mm 30.000 mm 30.000 mm 30.0000 mm 30.000 mm 30.000 mm			grams			6:		
Hydrometer Reading Corrected Percent Soils Particle 1.5" 100% 50.000 mm 1.5" 100% 37.500 mm 1.0" 100% 25.000 mm 1.0" 100% 25.000 mm 1.0" 100%					ACCRECITED			
Hydrometer Reading Percent Soils Particle 1.5" 100% 5.000 mm	Adj. Sample Wgt :	50.70	grams					
Reading Passing Diameter 1.2" 100% 37.500 mm 1.9" 109% 31.500 mm 1.9" 109% 31.500 mm 1.0" 100% 25.000 mm 1.0" 100% 25.000 mm 1.0" 100% 25.000 mm 1.0" 100% 25.000 mm 1.0" 100% 1000 mm 1.0" 1000 mm 10	Unduamatan							
Minutes Reading Passing Diameter 1.25" 100% 31.500 mm	•	Corrected	Percent	Soils Particle				
1 19.5 39.2% 0.0512 mm								
2								
12								
15						-		
30 5 10.1% 0.0101 mm 3/8" 100% 9.500 mm 14" 100% 6.300 mm 14" 100% 4.750 mm 1440 1 2.0% 0.0036 mm #10 100% 2.000 mm #20 100% 0.850 mm #20 100% 0.425 mm #20 100% 0.425 mm #20 100% 0.425 mm #30 100% 0.425 mm #40 100% 0.425 mm #40 100% 0.425 mm #30 100% 0.425 mm 1100 97% 0.150 mm 1100 97% 0.050 mm 0.050 m								
1/4" 100% 6.300 mm 1/4" 100% 6.300 mm 1/4" 100% 4.750 mm 100% 4.750 mm 100% 4.750 mm 100% 4.750 mm 1.750 mm								
1440 1 2.0% 0.0036 mm								
1440 1								
We can be considered 0.0% Liquid Limit: n/a #40 100% 0.850 mm								
We Gravel: 0.0% Liquid Limit: n/a #40 100% 0.425 mm	1110	•	2.070	0.0015 11111		· ·		
% Sand: 30.5% Plastic Limit: n/a #100 97% 0.150 mm % Silt: 64.7% Plasticity Index: n/a #200 69.5% 0.075 mm % Clay: 4.8% Silts 68.2% 0.074 mm 33.0% 0.050 mm 18.8% 0.020 mm Clays 4.8% 0.005 mm 2.5% 0.002 mm Colloids 1.4% 0.001 mm USDA Soil Textural Classification Particle Size 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm % Clay: < 0.002 mm % Silt: 0.05 - 0.002 mm % Silt: 0.05 - 0.003 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.004 mm **Colloids 1.4% 0.005 mm **Colloids 1.4% 0.001 mm **Colloids 1.4%	% Gravel:	0.0%		Liquid Limit: n/a				
We clay: 4.8% Plasticity Index: n/a #200 69.5% 0.075 mm				•				
% Clay: 4.8% Silts 68.2% 0.074 mm 33.0% 0.050 mm 18.8% 0.020 mm Clays 4.8% 0.005 mm 2.5% 0.002 mm Colloids 1.4% 0.001 mm Colloids 1.4% 0.001 mm WSDA Soil Textural Classification Particle Size 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification USDA Soil Textural Classification Sandy Loam WSDA Soil Textural Classification Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.								
USDA Soil Textural Classification Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification USDA Soil Textural Classification % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm USDA Soil Textural Classification Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.	% Clay:	4.8%		•		Silts	68.2%	0.074 mm
Clays 4.8% 0.005 mm 2.5% 0.002 mm Colloids 1.4% 0.001 mm USDA Soil Textural Classification Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification USDA Soil Textural Classification Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.	·						33.0%	0.050 mm
USDA Soil Textural Classification Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification USDA Soil Textural Classification Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.							18.8%	0.020 mm
USDA Soil Textural Classification Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.						Clays	4.8%	0.005 mm
USDA Soil Textural Classification Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.							2.5%	0.002 mm
Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.						Colloids	1.4%	0.001 mm
Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.								
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% Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm USDA Soil Textural Classification Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.			Particle Size					
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Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.	% Clay:		< 0.002 mm					
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All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.		USDA	Soil Textural C	lassification				
regarding our reports is reserved pending our written approval.			Sandy Loam					
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				l property of clients, and aut	horization for publication of	statements, conclusions or extracts from or		
Comments:	regarding our reports is reserved pend	ung our written approv	aı.					
Comments:								
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360.755.1990

www.mtc-inc.net

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT21-GB-26-31 ft

Sample#: B21-1446

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 23-Aug-21 Tested By: A. Eifrig

Unified Soils Classification System, ASTM D-2487

SM, Silty Sand Sample Color:

gray



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Space

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{c} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.013 \\ \textbf{D}_{(10)} = 0.026 \\ \textbf{D}_{(15)} = 0.039 \\ \textbf{D}_{(30)} = 0.077 \\ \textbf{D}_{(50)} = 0.119 \\ \textbf{D}_{(60)} = 0.140 \\ \textbf{D}_{(90)} = 0.354 \\ \textbf{Ratio} = 12441 \\ \end{array}$ mm % Gravel = 0.0% % Sand = 71.1% mm % Silt & Clay = 28.9% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a

mm Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 1.65$ Coeff. of Uniformity, $C_U = 5.38$ Fineness Modulus = 0.53

Plastic Limit = n/a Moisture %, as sampled = 34.2% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face =

		Actual	Interpolated		STM C136, AS	V				Samin C	- Distant	£								_
		Cumulative	Cumulative							Grain Siz		JTION								
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#80	0.180		69%	100.0%	0.0%		0%	100.00		10.00		1.0	Mibid	-00-00	0.100		0.010	шш	0.001	0.0%
#100	0.150	65%	65%	100.0%	0.0%			100.00		10.00	~	1.01			5.100		0.010		0.001	
#140	0.106		44%	100.0%	0.0%					F	article Siz	e (mm)								
#170	0.090		36%	100.0%	0.0%															
#200	0.075	28.9%	28.9%	100.0%	0.0%		Sieve Sizes			— Max S	pecs	_	. _	Min Spec	cs	_	Si	eve Result	s	
Copyright		ļ	II .			lk .														

Reviewed by: _



As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	Please See Attached Reports		Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count			LA Abrasion	
X	Moisture Content	Please See Attached Report	X	Direct Shear	Please See Attached Reports
	Specific Gravity, Coarse		X	Specific Gravity, Soils	Please See Attached Reports
	Specific Gravity, Fine				
X	Hydrometer Analysis	Please See Attached Reports			
X	Atterberg Limits	Please See Attached Reports			

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted, Meghan Blodgett-Carrillo

WABO Supervising Laboratory Technician



Moisture Content - ASTM C566, ASTM D2216

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: August 24, 2021	Tested by: A. Eifrig

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B21-1321	LDW21-GT24-0-5 ft	233.2	648.4	595.4	53.0	362.2	14.6%
B21-1322	LDW21-GT24-5-13.6ft	234.1	1046.2	877.7	168.5	643.6	26.2%
B21-1323	LDW21-GT24-13.6-29 ft	232.6	1197.1	1046.9	150.2	814.3	18.4%
B21-1324	LDW21-GT24-33-35 ft	229.5	540.4	454.5	85.9	225.0	38.2%
B21-1325	LDW21-GT24-35-43 ft	233.3	1203.4	995.3	208.1	762.0	27.3%
B21-1326	LDW21-GT24-43-50 ft	223.9	840.4	682.9	157.5	459.0	34.3%
B21-1327	LDW21-GT24-53.3-59 ft	234.6	1087.0	874.9	212.1	640.3	33.1%
B21-1328	LDW21-GT36-0-3.6 ft	215.2	760.8	729.9	30.9	514.7	6.0%
B21-1329	LDW21-GT36-3.6-6.2 ft	217.1	499.1	461.2	37.9	244.1	15.5%
B21-1330	LDW21-GT36-6.2-9.5 ft	91.9	740.7	600.6	140.1	508.7	27.5%
B21-1331	LDW21-GT36-9.5-11.7 ft	221.2	864.4	682.7	181.7	461.5	39.4%
B21-1332	LDW21-GT36-11.7-32 ft	215.5	1106.1	985.3	120.8	769.8	15.7%
B21-1333	LDW21-GT36-32-34.7 ft	223.9	674.7	563.9	110.8	340.0	32.6%
B21-1334	LDW21-GT36-34.7-50 ft	759.4	1828.1	1623.0	205.1	863.6	23.7%
B21-1335	LDW21-GT36-50.5-61.5 ft	233.5	678.3	545.8	132.5	312.3	42.4%

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is

Reviewed by:



Moisture Content - ASTM D854

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: August 26, 2021	Tested by: A. Eifrig

	ī			•		1	•	•	■ Mass at	•				
									Mass of	Massaf	Т		Т	
			D C 11	M CD		3.6 C	37.1		Pycno filled				Temp.	
		_		Mass of Dry		Mass of		Density of						Corrected
Sample #	Location	Tare	Tare	Soil	Pycno ID	Pycno	Pycno	Water @ Tx		w/ water	*C	Soils	Factor	SpG
B21-1323	LDW21-GT24-13.6-29 ft	601.52	701.51	100.0	TSA-010	180.3	499.5	0.99754	742.00	678.62		2.7311347		2.7293049
B21-1326	LDW21-GT24-43-50 ft	497.42	571.51	74.1	TSA-017	187.9	499.4	0.99754	731.68	686.06		2.6022626		2.600519
B21-1332	LDW21-GT36-11.7-32 ft	497.79	598.00	100.2	TSA-015	187.6	499.5	0.99754	748.84	685.87	23.0	2.6908295		2.6890267
B21-1335	LDW21-GT36-50.5-61.5 ft	600.15	650.57	50.4	TSA-016	197.2	499.5	0.99754	726.46	695.45	23.0	2.5974523	0.99933	2.595712

All results apply only to actual locations and materials tested.	As a mutual protection to clients, the	e public and ourselves, all reports are subn	nitted as the confidential property of clients, and au	uthorization for publication of statements, con	iclusions or extracts from or regarding our rep	orts is reserved pending our written approval.

Reviewed by:

Meghan Blodgett-Carrillo



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW-GT24-5-13.6 ft Sample#: B21-1322

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 24-Aug-21 Tested By: A. Eifrig

Unified Soil Classification System, ASTM-2487

SP, Poorly graded Sand

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Meghan Blodgett-Carrillo

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.087 \\ \textbf{D}_{(10)} = 0.149 \\ \textbf{D}_{(15)} = 0.176 \\ \textbf{D}_{(30)} = 0.252 \\ \textbf{D}_{(50)} = 0.321 \\ \textbf{D}_{(60)} = 0.355 \\ \textbf{D}_{(90)} = 0.640 \\ \textbf{D}_{(50)} = 0.420 \\ \textbf$ mm % Gravel = 0.4% % Sand = 95.6% mm % Silt & Clay = 4.0% mm mm Liquid Limit = 0.0% Plasticity Index = 0.0% mm Sand Equivalent = n/a

mm Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 1.20$ Coeff. of Uniformity, $C_U = 2.38$ Fineness Modulus = 1.60

Plastic Limit = 0.0% Moisture %, as sampled = 26.2% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

					Di	$D_{(90)} = 0.040$ ust Ratio = 1/20	111111	Fracture %, 2+ F			ture %, 2+ Fa	
				AS		TM D6913, ASTM	C117	11ucture 70, 2+1	uccs 11/4	Requirae	uic /0, 2 1	1005
		Actual	Interpolated	AS	1101 C130, A31	W D0713, A31W	CIII					
		Cumulative	Cumulative					Grain Size Distrib				
Sieve	Size	Percent	Percent	Specs	Specs			27. 17. 17. 18. 28. 37. 44.	©= 288 488 88	1988		
US	Metric	Passing	Passing	Max	Min	1	% +) 62	## = # £ £ £ £ £ £ £ £ £ £ £ £ £ £ £ £ £	2 28		- 100.0%
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2.00"	50.00	100%	100%	100.0%	0.0%		70%					70.0%
1.75"	45.00		100%	100.0%	0.0%							1
1.50"	37.50		100%	100.0%	0.0%							1
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1.00"	25.00	100%	100%	100.0%	0.0%	D C						50.0% %
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1/2"	12.50	100%	100%	100.0%	0.0%		F I III					1
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1/4"	6.30		100%	100.0%	0.0%							1
#4	4.75	100%	100%	100.0%	0.0%							1
#8	2.36		100%	100.0%	0.0%		30%					30.0%
#10	2.00	100%	100%	100.0%	0.0%				\			1
#16	1.18		99%	100.0%	0.0%		20%					20.0%
#20	0.850	99%	99%	100.0%	0.0%		100		l IIIIIII L			10.0%
#30	0.600		88%	100.0%	0.0%		E I III		i i iiiii i i ii			1
#40	0.425	81%	81%	100.0%	0.0%		10%					10.0%
#50	0.300		44%	100.0%	0.0%		F I III			X		ł
#60	0.250	29%	29%	100.0%	0.0%		[_]	JJ		JI Ů		1
#80	0.180		16%	100.0%	0.0%		0% 100.00	0 10.000	1.000	0.100	0.010	0.0%
#100	0.150	10%	10%	100.0%	0.0%							
#140	0.106		7%	100.0%	0.0%			Particle Si	ze (mm)			
#170	0.090		5%	100.0%	0.0%							
#200	0.075	4.0%	4.0%	100.0%	0.0%	+ Si	eve Sizes	—▲ — Max Specs	- Min Sper	os	Sieve Results	
	Spears Engineering & Tec											
results apply only to a	ctual locations and material	s tested. As a mutual prote	ection to clients, the public	and ourselves, all reports are	submitted as the confide	ntial property of clients, and	authorization for pu	iblication of statements, conc	lusions or extracts from or r	egarding our reports	is reserved pending	our written approv

Comments: Reviewed by: _

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1322
Sample Date:	7/26/2021
Test Date:	8/24/2021
Technician:	M. Carrillo

 Sample Source:
 LDW-GT24-5-13.6 ft

 Visual Soil Description:
 brown sand with silt

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

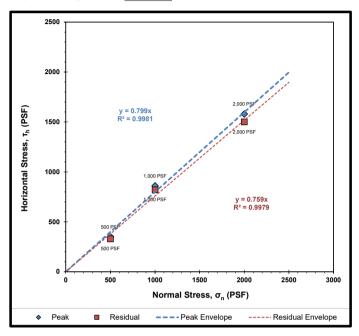
Specimen Height (in): 1
Rate of Strain (in/min): 0.0208
Estimated Specific Gravity of Solids: 2.65

Summary of Sampl	e Data:	σ _n =500 PSF
Initial Moisture Content (%):	26.4	
	Initial	Post-Consolidation
Dry Density (PCF):	108.1	108.3
Void Ratio:	0.559	0.556
Porosity (%):	35.9	35.7
Degree of Saturation (%):	saturated	saturated

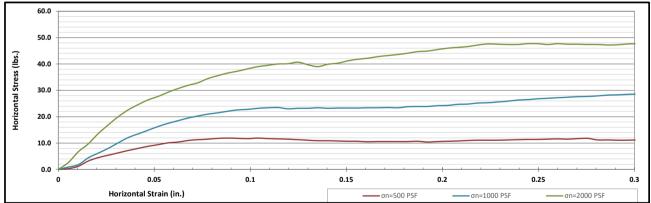
Summary of Sample	Data:	σ _n =1000 PSF
Initial Moisture Content (%):	27.1	
	Initial	Post-Consolidation
Dry Density (PCF):	107.4	109.3
Void Ratio:	0.569	0.541
Porosity (%):	36.3	35.1
Degree of Saturation (%):	saturated	saturated

Summary of Sample	e Data:	σ _n =2000 PSF
Initial Moisture Content (%):	29.0	
	Initial	Post-Consolidation
Dry Density (PCF):	105.6	108.6
Void Ratio:	0.595	0.551
Porosity (%):	37.3	35.5
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRI	ENGTH PARA	METERS
	PEAK	RESIDUAL
Angle of Internal Friction, φ (°):	39	37
Cohesion (PSF):	0	0



Failure Envelope Test	Values:		
Normal Stress, σ _n (PSF):	500	1000	2000
Peak Horizontal Stress, τ _h (PSF):	350	860	1580
Residual Horizontal Stress, τ _h (PSF):	330	820	1500





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW-GT24-13.6-29 ft **Sample#:** B21-1323

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 24-Aug-21

Tested By: A. Eifrig

Unified Soil Classification System, ASTM-2487

SP, Poorly graded Sand

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Specs

Sample Meets Specs ? N/A

 $D_{(90)} = 0.815$ mm Fracture %, 1 Face = n/a Ratio = 1/14 Fracture %, 2+ Faces = n/a Coeff. of Curvature, $C_C = 1.15$ Coeff. of Uniformity, $C_U = 2.81$ Fineness Modulus = 1.94

Plastic Limit = 0.0% Moisture %, as sampled = 18.4% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face =
Reg'd Fracture %, 2+ Faces =

						ıst Ratio = 1			Fractur	e %, 2+	Faces =	n/a		Req'o	1 Fracti	ıre %, 2	2+ Fac	es =
			T . 1 . 1	AS	TM C136, AS	M D6913, AS	TM C117											
		Actual	Interpolated			ľ			Grai	n Size Distr	ibution							
			Cumulative	_	_	4			ŧ, .									
Sieve Siz		Percent	Percent	Specs	Specs		b ;	o io i+ io	2 %	3/8*	e02 2	888	8885	28				
US	Metric	Passing	Passing	Max	Min		100%			•	- i i - i	* * * *	+ + +	II TT	TT	шпт	ТТ	T 100.0%
12.00"	300.00		100%	100.0%	0.0%		-				\							}
10.00"	250.00		100%	100.0%	0.0%													1
8.00"	200.00		100%	100.0%	0.0%		90%							mm			11	90.0%
6.00"	150.00		100%	100.0%	0.0%													1
4.00"	100.00		100%	100.0%	0.0%		80%											80.0%
3.00"	75.00		100%	100.0%	0.0%		00,0											1 00.0,0
2.50"	63.00		100%	100.0%	0.0%		F											}
2.00"	50.00	100%	100%	100.0%	0.0%		70%					₩i₩	 		 			70.0%
1.75"	45.00		100%	100.0%	0.0%							111						1
1.50"	37.50		100%	100.0%	0.0%		1					III \						1
1.25"	31.50		100%	100.0%	0.0%		60%				++-	###\ !			++-		-	60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	ē	ŀ					III i						2
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	50%					 						50.0%
5/8"	16.00		100%	100.0%	0.0%	96	50%											50.0% 88
1/2"	12.50	100%	100%	100.0%	0.0%													1
3/8"	9.50	100%	100%	100.0%	0.0%		40%							ЩЩ	-			40.0%
1/4"	6.30		100%	100.0%	0.0%													1
#4	4.75	100%	100%	100.0%	0.0%								l I					1
#8	2.36		100%	100.0%	0.0%		30%						i		+		-	30.0%
#10	2.00	99%	99%	100.0%	0.0%		-						1					1
#16	1.18		95%	100.0%	0.0%								Į.					20.0%
#20	0.850	93%	93%	100.0%	0.0%		20%						T\					20.0%
#30	0.600		72%	100.0%	0.0%													1
#40	0.425	57%	57%	100.0%	0.0%		10%					Ш.	11	шш.				10.0%
#50	0.300		32%	100.0%	0.0%													1
#60	0.250	21%	21%	100.0%	0.0%		1							*				1
#80	0.180		12%	100.0%	0.0%		0%	100.000		10.000		000	0.1	100	11	11111111 010		1 0.0% .001
#100	0.150	8%	8%	100.0%	0.0%			100.000		10.000	1.7	JUU	0.1	100	0.	JIU	U.	.001
#140	0.106		6%	100.0%	0.0%					Particle	Size (mm)							
#170	0.090		5%	100.0%	0.0%													
#200	0.075	4.1%	4.1%	100.0%	0.0%		Sieve Sizes			Max Specs	_	 -	Min Specs			Sieve Re	sults	
		mical Services PS, 1996-9	l	100.070	0.070		2.270 01203									2.2.10 KG		

Il results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval

Comments:

Mant, Philosoft fair Ma

Meghan Blodgett-Carrillo

Reviewed by:

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ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Pr	Project: Q.C Lower Duwamis roject #: 21B233 Client: Anchor QEA Source: LDW-GT24-33-35 ft imple #: B21-1324	sh Waterway	:	te Received: Sampled By: Date Tested: Tested By:	Client 25-Aug-21		Visual Identific Sandy Silt Sample Color brown	ation
		Y	D					
		Liquid Limit	#2	on #3	#4	#5	#6	
	Weight of Wet Soils + Pan:	#1	πΔ	πο	# -	π5	#0	
	Weight of Dry Soils + Pan:	Liquid Lin	nit cannot be es	tablished				
	Weight of Pan:	·						
	Weight of Dry Soils:							Liquid Limit @ 25 Blows: N/A
	Weight of Moisture: % Moisture:							Plastic Limit: N/A Plasticity Index, I _P : N/A
	Number of Blows:							I maticity flucia, ip.
		Plastic Limit	Determinati	on				
		#1	#2	#3	#4	#5	#6	
	Weight of Wet Soils + Pan:	Diameia I in	nit cannot be de	4				
	Weight of Dry Soils + Pan: Weight of Pan:	Plastic Lif	nt cannot be de	termined				
	Weight of Dry Soils:							ACCREDITED
	Weight of Moisture: % Moisture:							Certificate #: 1366.01, 1366.02 & 1366.04
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,							
	70 % T	Plastic	ity Chart					Liquid Limit
	70 %							100%
	60 %				J' Line	"Hipe		90%
	50 %			"1) OH	WALL LAND		80%
ex			1 /	-14	orOH			2 70%
Plasticity Index	40 %			9				00%
icity	30 %							₩ 50% -
ast	20.00	or						40%
4	20 %	CLorOL		N	IH or OH			30%
	10 %							20%
	0 % CL-ML	ML or OL					•	10%
	0% 10% 20%			70%	80%	90% 10	00% 110%	0% 10 100
		Liqu	iid Limit					Number of Blows, "N"
	Copyright Spears Engineering & Technical Se				50 1 d E1		-tdthiti t	publication of statements, conclusions or extracts from or regarding our

Comments: Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the liquid limit device without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA Source: LDW-GT24-35-43 ft

Sample#: B21-1325

Comments:

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 24-Aug-21 Tested By: A. Eifrig

Unified Soil Classification System, ASTM-2487

SP-SM, Poorly graded Sand with Silt

Sample Color:

mm

gray



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{c} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.042 \\ \textbf{D}_{(10)} = 0.082 \\ \textbf{D}_{(15)} = 0.114 \\ \textbf{D}_{(30)} = 0.175 \\ \textbf{D}_{(50)} = 0.227 \\ \textbf{D}_{(60)} = 0.257 \\ \textbf{D}_{(90)} = 0.414 \\ \textbf{Ratio} = 3/31 \\ \end{array}$ mm % Gravel = 0.0% % Sand = 91.1% mm % Silt & Clay = 8.9% mm mm Liquid Limit = 0.0% Plasticity Index = 0.0% mm

Sand Equivalent = n/a Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 1.45$ Coeff. of Uniformity, $C_U = 3.14$ Fineness Modulus = 1.17 Plastic Limit = 0.0%

Moisture %, as sampled = 27.3% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

						ust Ratio = 3/31		F	racture	%, 2+ F	aces = 1	n/a			Fractur		Faces =
				AS	TM C136, AST	TM D6913, ASTN	M C117										
		Actual	Interpolated						Grain	Size Distrib	ution						
		Cumulative	Cumulative														
Sieve		Percent	Percent	Specs	Specs		b 1.	9 44 9 N		3/8	8° 2° 8	8 8 8	38888	28			
US	Metric	Passing	Passing	Max	Min	1	100%			or or a		# # #		+	- тт		T 100.0%
12.00"	300.00		100%	100.0%	0.0%		11					N. I					1 1
10.00"	250.00		100%	100.0%	0.0%		11										
8.00"	200.00		100%	100.0%	0.0%		90%									HHHH	90.0%
6.00"	150.00		100%	100.0%	0.0%		11										1 1
4.00"	100.00		100%	100.0%	0.0%		80%										80.0%
3.00"	75.00		100%	100.0%	0.0%		00%										1 00.0%
2.50"	63.00		100%	100.0%	0.0%		- []										1 1
2.00"	50.00	100%	100%	100.0%	0.0%		70%						-			HHHH	70.0%
1.75"	45.00		100%	100.0%	0.0%												1 1
1.50"	37.50		100%	100.0%	0.0%		11						1				1 1
1.25"	31.50		100%	100.0%	0.0%		60%						<u> </u>			\square	60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	D L	ł I						1				
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	50%						1				50.0%
5/8"	16.00		100%	100.0%	0.0%	96	30%										30.0% %
1/2"	12.50	100%	100%	100.0%	0.0%		11										1 1
3/8"	9.50	100%	100%	100.0%	0.0%		40%										40.0%
1/4"	6.30		100%	100.0%	0.0%		11										1 1
#4	4.75	100%	100%	100.0%	0.0%		11						ļ.				1 1
#8	2.36		100%	100.0%	0.0%		30%						-1-			HHHH	30.0%
#10	2.00	100%	100%	100.0%	0.0%		- H										1 1
#16	1.18		99%	100.0%	0.0%								ı İ				1
#20	0.850	99%	99%	100.0%	0.0%		20%						T \	Ш			20.0%
#30	0.600		95%	100.0%	0.0%		- 11						1				
#40	0.425	92%	92%	100.0%	0.0%		10%						1				10.0%
#50	0.300		68%	100.0%	0.0%									m			
#60	0.250	59%	59%	100.0%	0.0%												
#80	0.180		32%	100.0%	0.0%		0%	100.000		.000	1.000	-	0.10	M M	0.01	<u> </u>	0.0%
#100	0.150	21%	21%	100.0%	0.0%			100.000	10		1.000	,	0.10	50	0.01	,	0.001
#140	0.106		14%	100.0%	0.0%					Particle Siz	e (mm)						
#170	0.090		11%	100.0%	0.0%												
#200	0.075	8.9%	8.9%	100.0%	0.0%	+	Sieve Sizes	_	Mo	x Specs	_	• — N	tin Specs			Sieve Resul	is
	Spears Engineering & Tecl		Į.		2.070												
				and ourselves, all reports are	submitted as the confide	ntial property of clients and	d authorizatio	n for publica	tion of state	ments conc	usions or ex	vtracts fr	om or raga	rding our r	anorte is ra	served nend	ing our written and

Reviewed by: Meghan Blodgett-Carrillo

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ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Pro	Project: Q.C Lower Duwamis oject #: 21B233 Client: Anchor QEA Source: LDW-GT24-43-50 ft mple #: B21-1326	h Waterway	:	te Received: Sampled By: Date Tested: Tested By:	Client 25-Aug-21		Visual Identific Silty Sand Sample Color dark brown	cation
		Liquid Li	nit Determinati	on				
	Weight of Wet Soils + Pan:	#1	#2	#3	#4	#5	#6	
	Weight of Dry Soils + Pan:	Liquid	Limit cannot be es	tablished				
	Weight of Pan:							
	Weight of Dry Soils: Weight of Moisture:							Liquid Limit @ 25 Blows: N/A Plastic Limit: N/A
	% Moisture:							Plasticity Index, I _P : N/A
	Number of Blows:							
		Plastic Li	nit Determinati	on				
	W'ILEWACT D	#1	#2	#3	#4	#5	#6	
	Weight of Wet Soils + Pan: Weight of Dry Soils + Pan:	Plastic	Limit cannot be de	termined				
	Weight of Pan:							
	Weight of Dry Soils: Weight of Moisture:							ACCREDITED Certificate #: 1366.01, 1366.02 & 1366.04
	% Moisture:							
		Plas	ticity Chart					Limit Limit
	70 %							Liquid Limit
	60 %		-		Ji Line	, Lipe		90%
	50 %			ii)	orOH	MAN LIKE		80%
дех	40 %			CY	or O.			2 70%
Plasticity Index								e.m. 60%
stici	30 %							× 50% + 40% + 40% + 100
Plas	20 %	CLorOL						30%
	10 %	0		IV	IH or OH			20%
	CL-ML	ML or OL						10%
	0% 10% 20%	30% 40%	50% 60	0% 70%	80%	90% 100	0% 110%	0% 10 100
		L	iquid Limit					Number of Blows, "N"
	Copyright Spears Engineering & Technical Scopply only to actual locations and materials tester							

Comments: Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the liquid limit device without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW-GT24-53.3-59 ft Sample#: B21-1327

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 24-Aug-21 Tested By: A. Eifrig

Visual Identification

Sandy Silt Sample Color: brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{c} D_{(5)} = 0.007 \\ D_{(10)} = 0.014 \\ D_{(15)} = 0.021 \\ D_{(30)} = 0.042 \\ D_{(50)} = 0.070 \\ D_{(50)} = 0.070 \\ D_{(50)} = 0.082 \end{array}$ mm % Gravel = 0.0% % Sand = 46.3% mm % Silt & Clay = 53.7% mm mm Liquid Limit = n/a mm Plasticity Index = n/a $D_{(60)} = 0.088$ $D_{(90)} = 0.161$ mm Sand Equivalent = n/a

mm Fracture %. 1 Face = n/a Coeff. of Curvature, $C_C = 1.42$ Coeff. of Uniformity, $C_U = 6.33$ Fineness Modulus = 0.15 Plastic Limit = n/a

Moisture %, as sampled = 33.1% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

					_	D ₍₉₀₎ - 0.10			acture 70,	
						st Ratio = 6/1		Fract	ture %, 2+	- Faces
			Tr . 1	AS	STM C136, AST	M D6913, AST	CM C117			
		Actual	Interpolated			ľ		G	Grain Size Dist	tribution
		-	Cumulative		_			Ę.,		
	Size	Percent	Percent	Specs	Specs		io io io	1 2 3 4 c	% % 4 4 % % 8 4 4	eo⊆ ###
US	Metric	Passing	Passing	Max	Min		100%			·
12.00"	300.00		100%	100.0%	0.0%		[]			
10.00"	250.00		100%	100.0%	0.0%					
8.00"	200.00		100%	100.0%	0.0%		90%		T	m
6.00"	150.00		100%	100.0%	0.0%					
4.00"	100.00		100%	100.0%	0.0%		80%			
3.00"	75.00		100%	100.0%	0.0%					
2.50"	63.00		100%	100.0%	0.0%		1			
2.00"	50.00	100%	100%	100.0%	0.0%		70%			++-+-
1.75"	45.00		100%	100.0%	0.0%					
1.50"	37.50		100%	100.0%	0.0%					
1.25"	31.50		100%	100.0%	0.0%		60%			++-
1.00"	25.00	100%	100%	100.0%	0.0%	.E				
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	50%			
5/8"	16.00		100%	100.0%	0.0%	84	50%			
1/2"	12.50	100%	100%	100.0%	0.0%		[]			
3/8"	9.50	100%	100%	100.0%	0.0%		40%			++-
1/4"	6.30		100%	100.0%	0.0%					
#4	4.75	100%	100%	100.0%	0.0%					
#8	2.36		100%	100.0%	0.0%		30%		1	
#10	2.00	100%	100%	100.0%	0.0%		11			
#16	1.18		100%	100.0%	0.0%		20%			
#20	0.850	100%	100%	100.0%	0.0%		20/0			
#30	0.600		99%	100.0%	0.0%					
#40	0.425	99%	99%	100.0%	0.0%		10%			
#50	0.300		98%	100.0%	0.0%					
#60	0.250	97%	97%	100.0%	0.0%					
#80	0.180		92%	100.0%	0.0%		0%	100.000	10.000	
#100	0.150	89%	89%	100.0%	0.0%					

100.0%

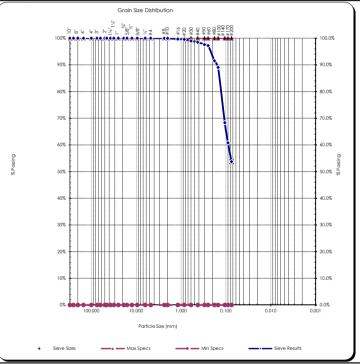
100.0%

100.0%

68%

61%

53.7%



0.0%

0.0%

0.0%

Comments:			
·			
	01 1 011 D. M.		

Meghan Blodgett-Carrillo

53.7%

0.106

0.090

0.075

#140

#170

#200

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW-GT36-3.6-6.2 ft Sample#: B21-1329

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 24-Aug-21 Tested By: A. Eifrig

Unified Soils Classification System, ASTM D-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications

No Specs

#170

#200

0.090

0.075

39.4%

Meghan Blodgett-Carrillo

Sample Meets Specs? N/A

 $\begin{array}{c} D_{(5)} = 0.016 \\ D_{(10)} = 0.055 \\ D_{(15)} = 0.058 \\ D_{(30)} = 0.069 \end{array}$ mm % Gravel = 8.6%% Sand = 52.0% mm % Silt & Clay = 39.4% mm mm Liquid Limit = n/a $D_{(50)} = 0.106$ mm Plasticity Index = n/a $D_{(60)} = 0.135$ mm Sand Equivalent = n/a $D_{(90)} = 4.129$ ust Ratio = 39/80 mm

Moisture %, as sampled = 15.5% Req'd Sand Equivalent = Fracture %, 1 Face = n/a
Fracture %, 2+ Faces = n/a

Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

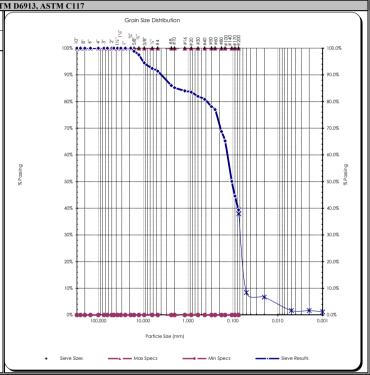
Coeff. of Curvature, $C_C = 0.64$

Coeff. of Uniformity, $C_U = 2.46$

Fineness Modulus = 1.19

Plastic Limit = n/a

				A S'	TM C136,
		Actual	Interpolated	AS.	I WI C130,
			Cumulative		
Sieve	Size	Percent	Percent	Specs	Specs
US	Metric	Passing	Passing	Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		99%	100.0%	0.0%
1/2"	12.50	98%	98%	100.0%	0.0%
3/8"	9.50	95%	95%	100.0%	0.0%
1/4"	6.30		92%	100.0%	0.0%
#4	4.75	91%	91%	100.0%	0.0%
#8	2.36		86%	100.0%	0.0%
#10	2.00	85%	85%	100.0%	0.0%
#16	1.18		84%	100.0%	0.0%
#20	0.850	84%	84%	100.0%	0.0%
#30	0.600		82%	100.0%	0.0%
#40	0.425	81%	81%	100.0%	0.0%
#50	0.300		78%	100.0%	0.0%
#60	0.250	77%	77%	100.0%	0.0%
#80	0.180		69%	100.0%	0.0%
#100	0.150	65%	65%	100.0%	0.0%
#140	0.106		50%	100.0%	0.0%
	1	1			



0.0%

0.0%

Comments: Reviewed by:

100.0%

100.0%

45%

39.4%



Hydrometer Report

Project:	Q.C Lower	Duwamish Wat	terway Date Recei	ved: 29-Jul-21	Unified Soils C	lassification Sy	stem, ASTM D-2487	
Project #: 2	21B233		Sampled	By: Client	SM, Silty Sand			
Client :	Anchor QEA		Date Tes	sted: 24-Aug-21	Sample Color			
Source:	LDW-GT36-3	3.6-6.2 ft	Tested	By: A. Eifrig	brown			
Sample#: 1								
AS	STM D7928	, HYDROME	ASTM D6913					
Assumed Sp Gr :	2.65	-					Analysis	
Sample Weight:	50.78	grams					Distribution	
Hydroscopic Moist.:	0.57%	8			Sieve	Percent	Soils Particle	
Adj. Sample Wgt :	50.49	grams		ACCREDITED	Size	Passing	Diameter	
raji sampie i i ge i	50.15	Brunns		Certificate #: 1366.01	3.0"	100%	75.000 mm	
Hydrometer					2.0"	100%	50.000 mm	
Reading	Corrected	Percent	Soils Particle		1.5"	100%	37.500 mm	
Minutes	Reading	Passing	Diameter		1.25"	100%	31.500 mm	
1	5	8.4%	0.0537 mm		1.0"	100%	25.000 mm	
2	5	8.4%	0.0380 mm		3/4"	100%	19.000 mm	
5	5	8.4%	0.0240 mm		5/8"	99%	16.000 mm	
15	2.5	4.2%	0.0141 mm		1/2"	98%	12.500 mm	
30	1	1.7%	0.0100 mm		3/8"	95%	9.500 mm	
60	1	1.7%	0.0071 mm		1/4"	92%	6.300 mm	
240	1	1.7%	0.0035 mm		#4	91%	4.750 mm	
1440	1	1.7%	0.0014 mm		#10	85%	2.000 mm	
- 1 1 1					#20	84%	0.850 mm	
% Gravel:	8.6%	L	iquid Limit: n/a		#40	81%	0.425 mm	
% Sand:	52.0%		lastic Limit: n/a		#100	65%	0.150 mm	
% Silt:	37.7%		ticity Index: n/a		#200	39.4%	0.075 mm	
% Clay:	1.7%				Silts	38.0%	0.074 mm	
/v c.m.j.	11,7,0					8.4%	0.050 mm	
						6.7%	0.020 mm	
					Clays	1.7%	0.005 mm	
					Ciays	1.7%	0.002 mm	
					Colloids	1.2%	0.001 mm	
					Conoras	1.270	0.001	
	USDA S	oil Textural C	Classification					
		Particle Size						
% Sand:		2.0 - 0.05 mm						
% Silt:		0.05 - 0.002 mm	į					
% Clay:		< 0.002 mm						
	TIOD 4 O		N 100 11					
	USDA S	oil Textural C	lassification					
		Sand						
All results annly only to actual location	ne and materiale tested	As a mutual protection to	cliente the public and ourselves	all reports are submitted as the cor	fidential property of cliente	and authorization for public	cation of statements, conclusions or extracts from or	
regarding our reports is reserved pend			cheris, the public and ourserves,	an reports are submitted as the con	indication property of citcatos, a	and addiorization for public	and of statements, conclusions of extracts from of	
C								
Comments:								
	1 . 1	abget arillo						
	Weigh Ell	reget and o						
Reviewed by:		0						
Terrewed by.	Manhan Dladass	. Camilla						

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1329
Sample Date:	7/26/2021
Test Date:	8/26/2021
Technician:	M. Carrillo

 Sample Source:
 LDW-GT36-3.6-6.2 ft

 Visual Soil Description:
 brown silty sand

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

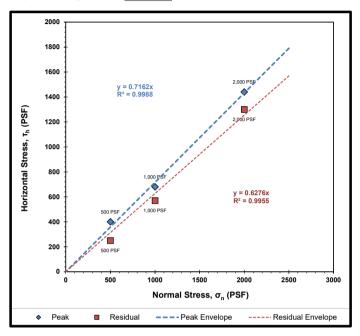
Specimen Height (in): 1
Rate of Strain (in/min): 0.0208
Estimated Specific Gravity of Solids: 2.65

Summary of Sample	e Data:	σ _n =500 PSF		
Initial Moisture Content (%):	19.8			
	Initial	Post-Consolidation		
Dry Density (PCF):	114.5	115.4		
Void Ratio:	0.472	0.460		
Porosity (%):	32.1	31.5		
Degree of Saturation (%):	saturated	saturated		

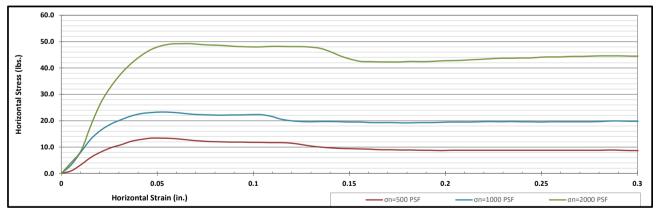
Summary of Sampl	le Data:	σ _n =1000 PSF		
Initial Moisture Content (%):	20.2			
	Initial	Post-Consolidation		
Dry Density (PCF):	115.0	117.1		
Void Ratio:	0.465	0.439		
Porosity (%):	31.7	30.5		
Degree of Saturation (%):	saturated	saturated		

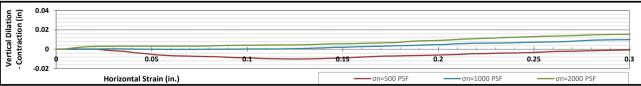
Summary of Sample	e Data:	σ _n =2000 PSF
Initial Moisture Content (%):	19.0	
	Initial	Post-Consolidation
Dry Density (PCF):	115.4	120.1
Void Ratio:	0.460	0.403
Porosity (%):	31.5	28.7
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS							
	PEAK	RESIDUAL					
Angle of Internal Friction, φ (°):	36	32					
Cohesion (PSF):	0	0					



Failure Envelope Test Values:									
Normal Stress, σ _n (PSF):	500	1000	2000						
Peak Horizontal Stress, τ _h (PSF):	400	680	1440						
Residual Horizontal Stress, τ _h (PSF):	250	570	1300						





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW-GT36-6.2-9.5 ft Sample#: B21-1330

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 24-Aug-21 Tested By: A. Eifrig

Unified Soils Classification System, ASTM D-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D43} \\ \textbf{D}_{(5)} = 0.017 \\ \textbf{D}_{(10)} = 0.035 \\ \textbf{D}_{(15)} = 0.052 \\ \textbf{D}_{(30)} = 0.092 \\ \textbf{D}_{(50)} = 0.132 \\ \textbf{D}_{(60)} = 0.152 \\ \textbf{D}_{(90)} = 0.240 \\ \textbf{Partice} = 7/32 \\ \textbf{Partice} = 7/32 \\ \textbf{D}_{(10)} = 0.132 \\ \textbf{D}_{(10)} = 0.240 \\ \textbf{D}_{$ mm % Gravel = 0.0% % Sand = 78.4% mm % Silt & Clay = 21.6% mm mm Liquid Limit = n/a Plasticity Index = n/a mm Sand Equivalent = n/a

mm Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 1.59$ Coeff. of Uniformity, $C_U = 4.38$ Fineness Modulus = 0.47

Plastic Limit = n/a Moisture %, as sampled = 27.5% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

Dust Ratio = $7/32$	Fracture %, 2+ Faces = n/a	Req'd Fracture %, 2+ Faces =
1 C136, ASTM D6913, ASTM C117		

				AS		IN D6913, ASTM C117
		Actual	Interpolated	Ass	1 C100, A51	
			Cumulative			Grain Size Distribution
Sieve	Size	Percent	Percent	Specs	Specs	p # 2 4 9 1 2 7
US	Metric	Passing	Passing	Max	Min	10002 10
12.00"	300.00		100%	100.0%	0.0%	
10.00"	250.00		100%	100.0%	0.0%	
8.00"	200.00		100%	100.0%	0.0%	90%
6.00"	150.00		100%	100.0%	0.0%	
4.00"	100.00		100%	100.0%	0.0%	
3.00"	75.00		100%	100.0%	0.0%	80.0%
2.50"	63.00		100%	100.0%	0.0%	
2.00"	50.00	100%	100%	100.0%	0.0%	70.0%
1.75"	45.00		100%	100.0%	0.0%	
1.50"	37.50		100%	100.0%	0.0%	
1.25"	31.50		100%	100.0%	0.0%	60%
1.00"	25.00	100%	100%	100.0%	0.0%	<u> </u>
3/4"	19.00	100%	100%	100.0%	0.0%	0.50 6.50 6.40 6.40 6.40 6.40 6.40 6.40 6.40 6.4
5/8"	16.00		100%	100.0%	0.0%	g 3000 b 1000 b
1/2"	12.50	100%	100%	100.0%	0.0%	
3/8"	9.50	100%	100%	100.0%	0.0%	40%
1/4"	6.30		100%	100.0%	0.0%	
#4	4.75	100%	100%	100.0%	0.0%	
#8	2.36		100%	100.0%	0.0%	30%
#10	2.00	100%	100%	100.0%	0.0%	
#16	1.18		100%	100.0%	0.0%	20%
#20	0.850	99%	99%	100.0%	0.0%	
#30	0.600		99%	100.0%	0.0%	
#40	0.425	99%	99%	100.0%	0.0%	10%
#50	0.300		95%	100.0%	0.0%	
#60	0.250	93%	93%	100.0%	0.0%	05 005
#80	0.180		70%	100.0%	0.0%	100.000 10.000 1.000 0.100 0.010 0.001
#100	0.150	59%	59%	100.0%	0.0%	
#140	0.106		37%	100.0%	0.0%	Particle Size (mm)
#170	0.090		29%	100.0%	0.0%	
#200	0.075	21.6%	21.6%	100.0%	0.0%	+ Sieve Sizes — Max Specs — Min Specs — Sieve Results
Copyright	Spears Engineering & Tee	chnical Services PS, 1996-9	8			

Comments:

Meghan Blodgett-Carrillo

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW-GT36-11.7-32 ft Sample#: B21-1332

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 24-Aug-21 Tested By: A. Eifrig

Unified Soils Classification System, ASTM D-2487

SP-SM, Poorly graded Sand with Silt

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{c} D_{(5)} = 0.053 \\ D_{(10)} = 0.129 \\ D_{(15)} = 0.186 \\ D_{(30)} = 0.285 \\ D_{(50)} = 0.368 \\ \end{array}$ mm % Gravel = 0.0%% Sand = 92.9% mm % Silt & Clay = 7.1% mm mm Liquid Limit = n/a Plasticity Index = n/a $D_{(60)} = 0.410$ $D_{(90)} = 0.738$ mm Sand Equivalent = n/a

. 1 Face = n/a + Faces = n/a Coeff. of Curvature, $C_C = 1.53$ Coeff. of Uniformity, $C_U = 3.18$ Fineness Modulus = 1.77 Plastic Limit = n/a

Moisture %, as sampled = 15.7% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

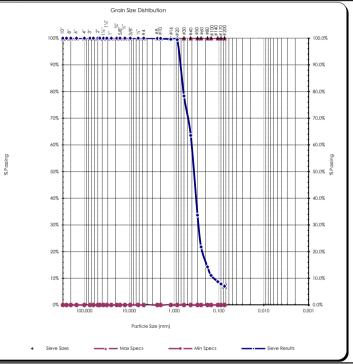
						$D_{(90)} = 0.738$	mm		Frac	cture 9	%, 1
					D	ust Ratio = 1/9		I	Fractu	re %,	2+
				AS	STM C136, AS	TM D6913, ASTM	I C117				
		-	Interpolated Cumulative							ain Size	
Sieve	Size	Percent	Percent	Specs	Specs		b : :	9 44 9 N	. 2 %	oš ² oš	- +
US	Metric	Passing	Passing	Max	Min		100%	*-***		ক ক ক	e ≟ Nation
12.00"	300.00		100%	100.0%	0.0%						
10.00"	250.00		100%	100.0%	0.0%						
8.00"	200.00		100%	100.0%	0.0%		90%		+++		Ш
6.00"	150.00		100%	100.0%	0.0%		- 1				
4.00"	100.00		100%	100.0%	0.0%		80%				
3.00"	75.00		100%	100.0%	0.0%		00%				Ш
2.50"	63.00		100%	100.0%	0.0%						
2.00"	50.00	100%	100%	100.0%	0.0%		70%		444		44
1.75"	45.00		100%	100.0%	0.0%						
1.50"	37.50		100%	100.0%	0.0%						
1.25"	31.50		100%	100.0%	0.0%		60%		+++	-	₩
1.00"	25.00	100%	100%	100.0%	0.0%	Ď.	H				
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	50%				
5/8"	16.00		100%	100.0%	0.0%	96	30%				Ш
1/2"	12.50	100%	100%	100.0%	0.0%						
3/8"	9.50	100%	100%	100.0%	0.0%		40%		+		##
1/4"	6.30		100%	100.0%	0.0%						
#4	4.75	100%	100%	100.0%	0.0%						
#8	2.36		100%	100.0%	0.0%		30%	-	+++	-H	Ш
#10	2.00	100%	100%	100.0%	0.0%		- 1				
#16	1.18		100%	100.0%	0.0%		20%				
#20	0.850	99%	99%	100.0%	0.0%		20%				Ш
#30	0.600		78%	100.0%	0.0%						
#40	0.425	64%	64%	100.0%	0.0%		10%		444		Ш
#50	0.300		34%	100.0%	0.0%						
#60	0.250	22%	22%	100.0%	0.0%						
#80	0.180		14%	100.0%	0.0%		0%	100.000	10000	10.000	••
#100	0.150	11%	11%	100.0%	0.0%			.00.000		10.000	
#140	0.106		9%	100.0%	0.0%					Pa	ırticle
11170	0.000		00/	100.00/	0.00/	II .					

100.0%

100.0%

8%

7.1%



Comments:

0.0%

0.0%

Meghan Blodgett-Carrillo

7.1%

0.090

0.075

#170

#200

Reviewed by:

Materials Testing & Consulting, Inc. Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting



ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C Lower Dr Project #: 21B233 Client: Anchor QEA Source: LDW-GT36-32- Sample #: B21-1333		Sampled Date Tes	ved: 29-Jul-21 By: Client sted: 25-Aug-21 By: C. Kriss	San	ual Identifica ad with Silt nple Color wn	ation
	Liquid Lim	it Determination				
	#1	#2 #3	#4	#5	#6	
Weight of Wet Soils + Par						
Weight of Dry Soils + Par	•	imit cannot be established				
Weight of Par Weight of Dry Soils						Liquid Limit @ 25 Blows: N/A
Weight of Moisture						Plastic Limit: N/A
% Moisture						Plasticity Index, I _P : N/A
Number of Blows	s:					
	Plastic Lim	it Determination				
	#1	#2 #3	#4	#5	#6	
Weight of Wet Soils + Par Weight of Dry Soils + Par		imit cannot be determined				
Weight of Dry Sons + Par		mint cannot be determined				
Weight of Dry Soils						ACCREDITED
Weight of Moisture % Moisture						Certificate #: 1366.01, 1366.02 & 1366.04
70 % -	Plast	icity Chart		***************************************	\	Liquid Limit
10 %						100% <u> </u>
60 %			"U" LINE	عملنا		90%
50 %			100 OH _	WANTER.		80%
6 Pu 40 %			CH or OH			70%
40 % Index of the second of th						sio W 50%
asti	ClorOt					40%
20 %	CLor		MH or OH			30%
10 %						20%
0 % CL-MI	' 			-		10%
0% 10%	20% 30% 40%	50% 60% quid Limit	70% 80%	90% 100%	110%	0% 10 100
		quiu Lilliit				Number of Blows, "N"
Copyright Spears Engineering & T		ha public and ourselves, all reports		ial property of clients, an	d authorization for n	oublication of statements, conclusions or extracts from or regarding our

Comments: Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the liquid limit device without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Meghan Blodgett-Carrillo

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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

#140

#170

#200

0.106

0.090

0.075

Source: LDW-GT36-34.7-50 ft Sample#: B21-1334

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 24-Aug-21

Tested By: A. Eifrig

Unified Soils Classification System, ASTM D-2487

SP-SM, Poorly graded Sand with Silt

Sample Color: grayish-brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

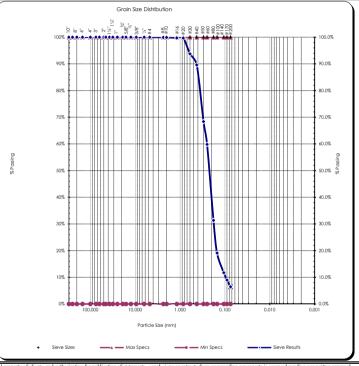
Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASTM D43} \\ \textbf{D}_{(5)} = 0.058 \\ \textbf{D}_{(10)} = 0.096 \\ \textbf{D}_{(15)} = 0.126 \\ \textbf{D}_{(30)} = 0.177 \\ \textbf{D}_{(50)} = 0.226 \\ \textbf{D}_{(60)} = 0.251 \\ \textbf{D}_{(90)} = 0.441 \end{array}$ mm % Gravel = 0.0% % Sand = 93.5% mm % Silt & Clay = 6.5% mm mm Liquid Limit = n/a mm Plasticity Index = n/amm

Sand Equivalent = n/a Fracture %, 1 Face = n/a ces = n/a Coeff. of Curvature, $C_C = 1.30$ Coeff. of Uniformity, $C_U = 2.62$ Fineness Modulus = 1.19

Plastic Limit = n/a Moisture %, as sampled = 23.7% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

						$D_{(90)} = 0.4$			acture %, 1	
						ust Ratio = 6		Fract	ure %, 2+ F	ac
				AS	TM C136, AS	ΓM D6913, A9	STM C117			
		Actual Cumulative	Interpolated Cumulative						Frain Size Distrib	utio
Sieve	Size	Percent	Percent	Specs	Specs		b::	12234		ϼ
US	Metric	Passing	Passing	Max	Min		100%	-*************************************	ან გა≟ ააა ტე ბა ლ	##: * 4.
12.00"	300.00		100%	100.0%	0.0%					.
10.00"	250.00		100%	100.0%	0.0%		<u> </u>			.
8.00"	200.00		100%	100.0%	0.0%		90%			+
6.00"	150.00		100%	100.0%	0.0%		H			. 1
4.00"	100.00		100%	100.0%	0.0%		80%			.
3.00"	75.00		100%	100.0%	0.0%		80%			П
2.50"	63.00		100%	100.0%	0.0%		1 1			.
2.00"	50.00	100%	100%	100.0%	0.0%		70%			_
1.75"	45.00		100%	100.0%	0.0%		11			.
1.50"	37.50		100%	100.0%	0.0%		l l			.
1.25"	31.50		100%	100.0%	0.0%		60%			+
1.00"	25.00	100%	100%	100.0%	0.0%	2	H			.
3/4"	19.00	100%	100%	100.0%	0.0%	% Possing	50%			.
5/8"	16.00		100%	100.0%	0.0%	P6	50%			
1/2"	12.50	100%	100%	100.0%	0.0%		ļ ļ			
3/8"	9.50	100%	100%	100.0%	0.0%		40%			_
1/4"	6.30		100%	100.0%	0.0%		!			.
#4	4.75	100%	100%	100.0%	0.0%		<u> </u>			.
#8	2.36		100%	100.0%	0.0%		30%			$^{+}$
#10	2.00	100%	100%	100.0%	0.0%		ł l			.
#16	1.18		100%	100.0%	0.0%		20%			.
#20	0.850	100%	100%	100.0%	0.0%		20%			П
#30	0.600		94%	100.0%	0.0%		FI			
#40	0.425	90%	90%	100.0%	0.0%		10%			4
#50	0.300		68%	100.0%	0.0%		‡			
#60	0.250	60%	60%	100.0%	0.0%		t I			
#80	0.180		31%	100.0%	0.0%		0%	00.000	10.000	-00
#100	0.150	19%	19%	100.0%	0.0%					



0.0%

0.0%

0.0%

Comments:		_
Reviewed by:	Mayh Balget aille	

100.0%

100.0%

100.0%

12%

9%

6.5%

6.5%

Materials Testing & Consulting, Inc. Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting



ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C Lower Duw Project #: 21B233 Client: Anchor QEA Source: LDW-GT-36-50.5 Sample #: B21-1335			ate Received: Sampled By: Date Tested: Tested By:	Client 25-Aug-21		Visual Identific Silty Clay Sample Color brown	ation
	Liquid L	imit Determinat	ion				
	#1	#2	#3	#4	#5	#6	
Weight of Wet Soils + Pan:	29.50	30.28	27.77				
Weight of Dry Soils + Pan:	26.95	27.50	24.20				
Weight of Pan:	19.61	19.98	14.98				
Weight of Dry Soils:	7.34	7.52	9.22				Liquid Limit @ 25 Blows: 36 %
Weight of Moisture:	2.55	2.78	3.57				Plastic Limit: 25 %
% Moisture:	34.7 %	37.0 %	38.7 %				Plasticity Index, Ip: 11 %
Number of Blows:	30	21	11				
Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Weight of Pan: Weight of Dry Soils: Weight of Moisture: % Moisture:	#1 34.74 33.48 28.53 4.95 1.26 25.5 %	#2 35.86 34.32 28.24 6.08 1.54 25.3 %	#3	#4	#5	#6	ACCREDITED Corrificate #: 1366.01, 1366.02 & 1366.04
70 %	Pla	sticity Chart		me			Liquid Limit
50 % 40 % 30 %			CH	or OH	white -		35% 30% 30% 25%
20 %	Clorot						15%
	00		M	H or OH			10%
10 %	M						
0%	ML or OL						5%
0% 10%	20% 30% 40%	50% 6	0% 70%	80%	90% 1	00% 110%	0%
	ı	iquid Limit					10 100 Number of Blows, "N"
Copyright Spears Engineering & Tech		-					Nulliber of blows, N
		s, the public and ourselv	es, all reports are sub	mitted as the confident	ial property of clie	nts, and authorization for	publication of statements, conclusions or extracts from or regarding
is reserved pending our written approval. mments:							
Nagh Bladge	Harillo						

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Meghan Blodgett-Carrillo

Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6111 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974 Visit our website: www.mtc-inc.net



Client:	Anchor QEA	Date:	September 29, 2021
Address:	21328 2nd Drive SE	Project:	Q.C Lower Duwamish Waterway
	Bothell, WA 98021	Project #:	21B233
Attn:	Garrett Timm	Sample #:	B21-1447 - 1466
Revised on:		Date sampled:	7-8-21 & 7-9-21

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	Please See Attached Reports		Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count			LA Abrasion	
X	Moisture Content	Please See Attached Report	X	Direct Shear	Please See Attached Reports
	Specific Gravity, Coarse		X	Specific Gravity, Soils	Please See Attached Reports
	Specific Gravity, Fine				
X	Hydrometer Analysis	Please See Attached Reports			
X	Atterberg Limits	Please See Attached Reports			

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted, Meghan Blodgett-Carrillo

WABO Supervising Laboratory Technician



Moisture Content - ASTM C566, ASTM D2216

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	-
Date Received: July 29, 2021	Sampled by: Client
Date Tested: August 31, 2021	Tested by: A. Eifrig

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B21-1447	LDW21-GT21-GB-31-32.5 ft	222.3	700.9	590.1	110.8	367.8	30.1%
B21-1448	LDW21-GT12-GB-0-1.5 ft	208.8	636.4	466.8	169.6	258.0	65.7%
B21-1449	LDW21-GT12-GB-0-12 ft	224.0	851.3	609.9	241.4	385.9	62.6%
B21-1450	LDW21-GT12-GB-12-13.5 ft	233.8	567.3	458.5	108.8	224.7	48.4%
B21-1451	LDW21-GT12-GB-18-22 ft	222.9	780.0	643.4	136.6	420.5	32.5%
B21-1452	LDW21-GT12-GB-22-23.5 ft	229.4	723.2	606.3	116.9	376.9	31.0%
B21-1453	LDW21-GT11-GB-0-1.5 ft	221.8	617.6	440.0	177.6	218.2	81.4%
B21-1454	LDW21-GT11-GB-0-8.5 ft	233.8	686.2	473.2	213.0	239.4	89.0%
B21-1455	LDW21-GT11-GB-8.5-10 ft	224.8	616.6	455.4	161.2	230.6	69.9%
B21-1456	LDW21-GT11-GB-8.5-16.7 ft	182.3	495.3	374.9	120.4	192.6	62.5%
B21-1457	LDW21-GT11-GB-16.7-18.5 ft	186.7	993.2	821.5	171.7	634.8	27.0%
B21-1458	LDW21-GT11-GB-18.5-20 ft	220.1	643.5	566.8	76.7	346.7	22.1%
B21-1459	LDW21-GT9-GB-0-1.5 ft	221.4	388.1	331.3	56.8	109.9	51.7%
B21-1460	LDW21-GT9-GB-10-11.5 ft	225.6	534.4	429.8	104.6	204.2	51.2%
B21-1461	LDW21-GT9-GB -16-20 ft -	225.7	665.4	521.2	144.2	295.5	48.8%
B21-1462	LDW21-GT9-GB-20-21.5 ft	235.5	299.4	285.9	13.5	50.4	26.8%
B21-1463	LDW21-GT7-GB-0-1.5 ft	301.1	545.2	480.4	64.8	179.3	36.1%
B21-1464	LDW21-GT7-GB-0-5.7 ft	182.9	988.2	806.6	181.6	623.7	29.1%
B21-1465	LDW21-GT7-GB-8.5-10 ft	217.2	591.3	504.5	86.8	287.3	30.2%
B21-1466	LDW21-GT7-GB-8.5-18.5 ft	233.4	693.2	578.2	115.0	344.8	33.4%

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:



Moisture Content - ASTM D854

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: August 31, 2021	Tested by: A. Eifrig

Sample # B21-1449 B21-1451	Location LDW21-GT12-GB-0-12 ft LDW21-GT12-GB-18-22 ft	Tare 493.02 497.56	Tare 545.53 597.70	Mass of Dry Soil 52.5 100.1	Pycno ID TSA-012 TSA-023	Mass of Pycno 180.4 163.9	Volume of Pycno 499.5 498.7	Water @ Tx 0.99749 0.99749	w/ water & soils 742.00 723.96	w/ water 709.46 661.41	Water, 0.1 *C 23.2 23.2	SpG of Soils 2.6294442 2.6641366	Factor 0.99929 0.99929	Corrected SpG 2.6275773 2.6622451
B21-1459	LDW21-GT9-GB-0-1.5 ft	601.92	676.89	75.0	TSA-015	187.6	499.5	0.99749	732.66	685.85		2.6626339		2.6607434
B21-1461	LDW21-GT7-GB-0-5.7 ft	502.15	601.95	99.8	TSA-021	183.4	499.4	0.99749	744.55	681.58	23.2	2.7100064	0.99929	2.7080823
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Il results apply only to actual locations and materials tested.	As a mutual protection to clients, the public and ourselves, all re	ports are submitted as the confidential property of clients, a	nd authorization for publication of statements, conclusions	s or extracts from or regarding our reports is reserved p	inding our written approval.
1	//				

Reviewed by:

Meghan Blodgett-Carrillo





ut results apply only to actual locations and materians tested. As a mutual protection to clients, the punic and ourserves, an reports are summitted as the contineernal property of clients, and authorization for punication of statements, conclusions or extracts from or regarding our

Comments: Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the cup without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

#140

#170

#200

0.106

0.090

0.075

19.3%

Source: LDW21-GT12-GB-18-22 ft Sample#: B21-1451

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 31-Aug-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

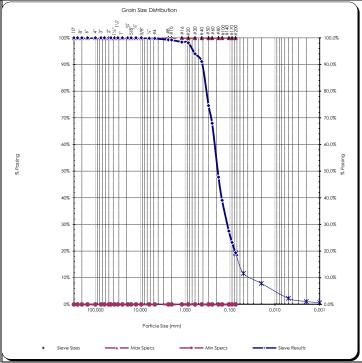
 $\begin{array}{c} D_{(5)} = 0.010 \\ D_{(10)} = 0.035 \\ D_{(15)} = 0.062 \\ D_{(30)} = 0.115 \\ D_{(30)} = 0.128 \end{array}$ mm mm mm $D_{(50)} = 0.188$

% Silt & Clay = 19.3% Liquid Limit = 0.0% Plasticity Index = 0.0% $D_{(60)} = 0.222$ mm Sand Equivalent = n/a $D_{(90)} = 0.417$ st Ratio = 7/33 Fracture %, 1 Face = n/a Fracture %, 2+ Faces = n/a mm M D6913, ASTM C117

Coeff. of Curvature, $C_C = 1.73$ Coeff. of Uniformity, $C_U = 6.41$ Fineness Modulus = 0.95 Plastic Limit = 0.0% Moisture %, as sampled = 32.5%

Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Reg'd Fracture %, 2+ Faces =

				AS	TM C136,
		Actual Cumulative	Interpolated Cumulative		
Sieve	Size	Percent	Percent	Specs	Specs
US	Metric	Passing	Passing	Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		99%	100.0%	0.0%
#10	2.00	99%	99%	100.0%	0.0%
#16	1.18		98%	100.0%	0.0%
#20	0.850	98%	98%	100.0%	0.0%
#30	0.600		94%	100.0%	0.0%
#40	0.425	91%	91%	100.0%	0.0%
#50	0.300		75%	100.0%	0.0%
#60	0.250	68%	68%	100.0%	0.0%
#80	0.180		48%	100.0%	0.0%
#100	0.150	39%	39%	100.0%	0.0%
	1	I	1		1



% Gravel = 0.2%

% Sand = 80.4%

0.0%

0.0%

0.0%

Comments: Reviewed by: Meghan Blodgett-Carrillo

28%

23%

19.3%

100.0%

100.0%

100.0%



Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Unified Soil Classification System, ASTM-2487 Project #: 21B233 Sampled By: Client SM, Silty Sand Client: Anchor QEA Date Tested: 31-Aug-21 Sample Color Source: LDW21-GT12-GB-18-22 ft Tested By: C. Kriss brown Sample#: B21-1451 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Sp Gr: Sieve Analysis 2.66 Sample Weight: 102.98 **Grain Size Distribution** Hydroscopic Moist.: 1.38% Soils Particle Sieve Percent ACCREDITED Passing Adj. Sample Wgt: 101.58 grams Size Diameter 75.000 mm 3.0" 100% 2.0" 100% 50.000 mm Hydrometer Soils Particle 37.500 mm 1.5" 100% Reading Corrected Percent 1.25" 31.500 mm 100% Minutes Reading **Passing** Diameter 0.0516 mm 100% 25.000 mm 11.7% 1.0" 0.0370 mm 10.3% 3/4" 10.5 100% 19.000 mm 0.0235 mm 5 9 8.8% 5/8" 100% 16.000 mm 15 6.5 6.3% $0.0138\ mm$ 1/2" 100% 12.500 mm 30 5 4 9% $0.0098\ mm$ 3/8" 100% 9.500 mm 60 3.5 3.4% $0.0070\ mm$ 1/4" 100% 6.300 mm 240 1.5 1.5% $0.0035 \ mm$ #4 100% 4.750 mm 1440 1.0% $0.0014\ mm$ #10 99% 2.000 mm 0.850 mm #20 98% % Gravel: 0.2% Liquid Limit: 0.0 % #40 0.425 mm % Sand: 80.4% Plastic Limit: 0.0 % #100 39% 0.150 mm % Silt: 17.1% Plasticity Index: 0.0 % #200 19.3% 0.075 mm 0.074 mm % Clay: 2.3% Silts 19.0% 0.050 mm 11.7% 7.9% 0.020 mm 2.3% 0.005 mm Clavs 0.002 mm 1.1% Colloids 0.7% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: % Silt: 0.05 - 0.002 mm < 0.002 mm % Clay: **USDA Soil Textural Classification** All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding **Comments:**

Reviewed by:

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1451
Sample Date:	7/8/2021
Test Date:	8/23/2021
Technician:	M. Carrillo

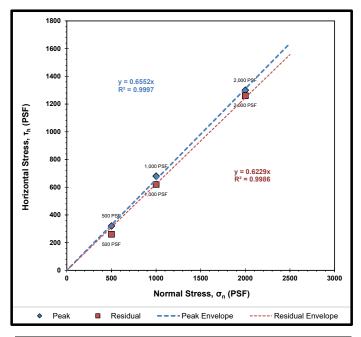
| Sample Source: LDW21-GT12-GB-18-22 ft |
| Visual Soil Description: brown clayey silt |
| Type of Specimen: Remolded Cylindrical Shear Box |
| Specimen Diameter (in): 2.5

Summary of Sample	σ _n =500 PSF	
Initial Moisture Content (%):	34.3	
	Initial	Post-Consolidation
Dry Density (PCF):	104.7	112.4
Void Ratio:	0.609	0.499
Porosity (%):	37.9	33.3
Degree of Saturation (%):	saturated	saturated

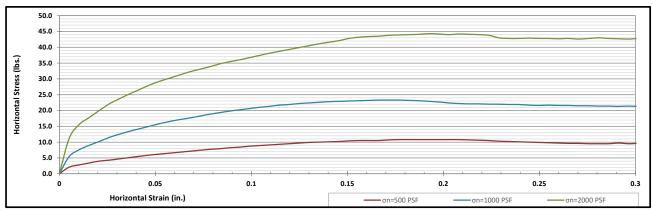
Summary of Samp	σ _n =1000 PSF	
Initial Moisture Content (%):	32.5	
	Initial	Post-Consolidation
Dry Density (PCF):	106.6	117.5
Void Ratio:	0.580	0.433
Porosity (%):	36.7	30.2
Degree of Saturation (%):	saturated	saturated

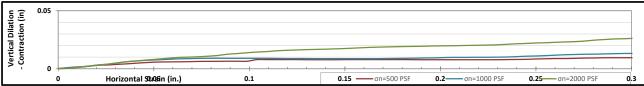
Summary of Sample	σ _n =2000 PSF	
Initial Moisture Content (%):	34.7	
	Initial	Post-Consolidation
Dry Density (PCF):	104.7	119.6
Void Ratio:	0.609	0.409
Porosity (%):	37.8	29.0
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS					
PEAK RESIDUAL					
Angle of Internal Friction, φ 33 32					
Cohesion (PSF):	0	0			



Failure Envelope Test Values:			
Normal Stress, σ _n (PSF):	500	1000	2000
Peak Horizontal Stress, τ _h (PSF):	320	680	1300
Residual Horizontal Stress, τ _h (PSF):	260	620	1260





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT11-GB-0-8.5 ft **Sample#:** B21-1454

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 31-Aug-21 Tested By: C. Kriss Unified Soil Classification System, ASTM-2487

ML, Sandy Silt Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications

No Specs

2.36

2.00

1.18

0.850

0.600

0.425

0.300

0.250

0.180

0.150

0.106

0.090

0.075

100%

99%

98%

96%

#8

#10 #16

#20

#30

#40

#50

#60

#80 #100

#140

#170

#200

Sample Meets Specs? N/A

Liquid Limit = 40.6%Plasticity Index = 0.0%Sand Equivalent = n/aFracture %, 1 Face = n/aFracture %, 2+ Faces = n/a

% Gravel = 0.0%

% Silt & Clay = 68.7%

% Sand = 31.3%

Coeff. of Curvature, $C_C = 3.47$ Coeff. of Uniformity, $C_U = 9.80$ Fineness Modulus = 0.14

Plastic Limit = 0.0% Moisture %, as sampled = 89.0% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

Reg'd Fracture %, 2+ Faces =

					_	- (90)	
						ust Ratio =	
			I	AS	TM C136, AS	TM D6913,	ASTM
		Actual	Interpolated			r	
		Cumulative	Cumulative		·h		
Sieve	Size	Percent	Percent	Specs	Specs		
US	Metric	Passing	Passing	Max	Min		1
12.00"	300.00		100%	100.0%	0.0%		
10.00"	250.00		100%	100.0%	0.0%		
8.00"	200.00		100%	100.0%	0.0%		
6.00"	150.00		100%	100.0%	0.0%		
4.00"	100.00		100%	100.0%	0.0%		
3.00"	75.00		100%	100.0%	0.0%		
2.50"	63.00		100%	100.0%	0.0%		
2.00"	50.00	100%	100%	100.0%	0.0%		
1.75"	45.00		100%	100.0%	0.0%		
1.50"	37.50		100%	100.0%	0.0%		
1.25"	31.50		100%	100.0%	0.0%		
1.00"	25.00	100%	100%	100.0%	0.0%	p	
3/4"	19.00	100%	100%	100.0%	0.0%	% Possing	
5/8"	16.00		100%	100.0%	0.0%	96	
1/2"	12.50	100%	100%	100.0%	0.0%		
3/8"	9.50	100%	100%	100.0%	0.0%		
1/4"	6.30		100%	100.0%	0.0%		
#4	4.75	100%	100%	100.0%	0.0%		

100%

100%

99%

98%

98%

97%

96%

93%

91%

78%

73%

68.7%

100.0%

100.0%

100.0%

100.0%

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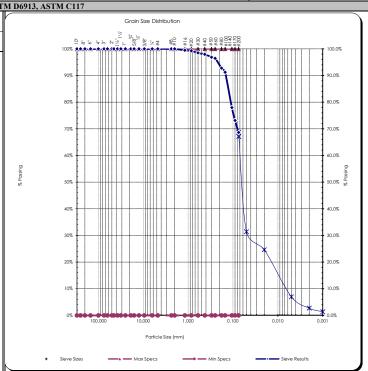
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Il results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval

Reviewed by:

Meghan Blodgett-Carrillo



Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Unified Soil Classification System, ASTM-2487 Project #: 21B233 Sampled By: Client ML, Sandy Silt Client: Anchor QEA Date Tested: 31-Aug-21 Sample Color Source: LDW21-GT11-GB-0-8.5 ft Tested By: C. Kriss brown Sample#: B21-1454 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Assumed Sp Gr: Sieve Analysis 2.65 53.60 Sample Weight: **Grain Size Distribution** Hydroscopic Moist.: 4.63% Soils Particle Sieve Percent 51.23 Passing Adj. Sample Wgt: grams Size Diameter 75.000 mm 3.0" 100% 2.0" 100% 50.000 mm Hydrometer Soils Particle 37.500 mm 1.5" 100% Reading Corrected Percent 1.25" 31.500 mm 100% Minutes Reading **Passing** Diameter 0.0505 mm 100% 25.000 mm 31.2% 1.0" 29.3% 0.0359 mm 3/4" 15 100% 19.000 mm 5 14 27.3% $0.0228\ mm$ 5/8" 100% 16.000 mm 15 9.5 18.5% $0.0136\ mm$ 1/2" 100% 12.500 mm 30 7.5 14.6% $0.0097\ mm$ 3/8" 100% 9.500 mm 60 5 9.8% $0.0069\ mm$ 1/4" 100% 6.300 mm 240 2.5 4.9% $0.0035 \ mm$ #4 100% 4.750 mm 1440 2.0% $0.0014\ mm$ #10 100% 2.000 mm 0.850 mm #20 99% % Gravel: 0.0% Liquid Limit: 40.6 % #40 98% 0.425 mm % Sand: 31.3% Plastic Limit: 0.0 % #100 91% 0.150 mm % Silt: 61.7% Plasticity Index: 0.0 % #200 68.7% 0.075 mm 0.074 mm % Clay: Silts 67.1% 0.050 mm 31.4% 24.6% 0.020 mm 7.0% 0.005 mm Clavs 2.7% 0.002 mm Colloids 1.4% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: % Silt: 0.05 - 0.002 mm < 0.002 mm % Clay: **USDA Soil Textural Classification** Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding Comments:

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Reviewed by:



Unified Soils Classification System, ASTM D-2487 Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Project #: 21B233 Sampled By: Client ML, Sandy Silt Client: Anchor QEA Date Tested: 31-Aug-21 Sample Color Source: LDW21-GT11-GB-0-8.5 ft Tested By: C. Kriss brown Sample #: B21-1454 **Liquid Limit Determination** Weight of Wet Soils + Pan: 32.18 28.53 30.48 27.32 Weight of Dry Soils + Pan: 28.57 24.52 15.03 Weight of Pan: 19.55 19.88 Liquid Limit @ 25 Blows: Weight of Dry Soils: 9.02 9 49 7 44 Weight of Moisture: Plastic Limit: 3.61 4.01 3.16 N/A % Moisture: Plasticity Index, I_P: 40.0 % 42.3 % 42.5 % N/A Number of Blows: Weight of Wet Soils + Pan: Plastic limit cannot be determined Weight of Dry Soils + Pan: Weight of Pan: Weight of Dry Soils: Weight of Moisture: % Moisture: **Plasticity Chart Liquid Limit** 80.0 % 100% 70.0 % 90% 60.0 % A" Line Plasticity Index 50.0 % 40.0 % 50% 30.0 % CLOrOL MH or OH 20% 10.0 % 10% ML or OL 0.0 % 100% 10 100 **Liquid Limit**

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Comments: Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling.

Reviewed by:

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1454
Sample Date:	7/8/2021
Test Date:	8/26/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT11-GB-0-8.5 ft

 Visual Soil Description:
 brown silty clay

 Type of Specimen:
 Remolded Cylindrical Shear Box

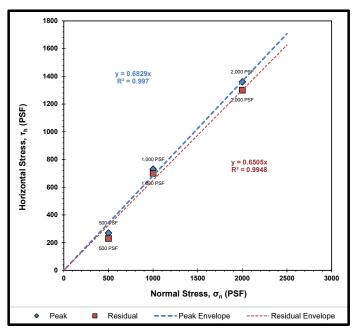
 Specimen Diameter (in):
 2.5

Summary of Sample	σ _n =500 PSF	
nitial Moisture Content (%): 58.2		
	Initial	Post-Consolidation
Dry Density (PCF):	76.6	86.1
Void Ratio:	1.201	0.957
Porosity (%):	54.6	48.9
Degree of Saturation (%):	saturated	saturated

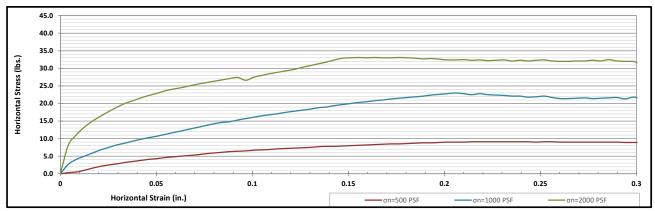
Summary of Sample	σ _n =1000 PSF	
nitial Moisture Content (%): 54.1		
	Initial	Post-Consolidation
Dry Density (PCF):	78.1	94.3
Void Ratio:	1.157	0.786
Porosity (%):	53.6	44.0
Degree of Saturation (%):	saturated	saturated

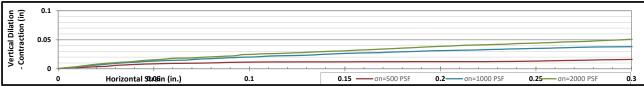
Summary of Sample	σ _n =2000 PSF	
Initial Moisture Content (%):	57.2	
	Initial	Post-Consolidation
Dry Density (PCF):	78.4	103.4
Void Ratio:	1.149	0.630
Porosity (%):	53.5	38.6
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS						
PEAK RESIDUAL						
Angle of Internal Friction, φ 34 33 33						
Cohesion (PSF):	0	0				



Failure Envelope Test Values:				
Normal Stress, σ _n (PSF):	500	1000	2000	
Peak Horizontal Stress, τ _h (PSF):	270	730	1360	
Residual Horizontal Stress, τ _h (PSF):	230	700	1300	





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Visual Identification Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Project #: 21B233 Sampled By: Client Clayey Silt Client: Anchor QEA Date Tested: 31-Aug-21 Sample Color Source: LDW21-GT11-GB-8.5-16.7 ft Tested By: C. Kriss brown Sample #: B21-1456 **Liquid Limit Determination** Weight of Wet Soils + Pan: 33.23 29.16 29.46 25.20 Weight of Dry Soils + Pan: 29.57 25.24 Weight of Pan: 19.86 15.05 14.81 Liquid Limit @ 25 Blows: Weight of Dry Soils: 9 71 10.15 10.43 38 % Weight of Moisture: Plastic Limit: 3.66 3.96 4.22 N/A % Moisture: 40.5 % Plasticity Index, I_P: 37.7 % 39.0 % N/A Number of Blows: Weight of Wet Soils + Pan: Plastic limit cannot be determined Weight of Dry Soils + Pan: Weight of Pan: Weight of Dry Soils: Weight of Moisture: % Moisture: **Plasticity Chart Liquid Limit** 80.0 % 100% 70.0 % 90% 60.0 % A" Line Plasticity Index 50.0 % 40.0 % 50% 30.0 % CLOrOL MH or OH 20% 10.0 % 10% ML or OL 0.0 % 90% 100% 10 100 **Liquid Limit**

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Comments: Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT11-GB-16.7-18.5 ft Sample#: B21-1457

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 31-Aug-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

gray



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

0.250

0.180

0.150

0.106

0.090

0.075

#60

#80

#140

#170

#200

Comments:

Sample Meets Specs? N/A

 $D_{(5)} = 0.019$ $D_{(10)} = 0.038$ $D_{(15)} = 0.057$ % Gravel = 0.0%% Sand = 80.2% mm % Silt & Clay = 19.8% mm $D_{(30)} = 0.126$ Liquid Limit = 0.0% mm $D_{(50)} = 0.220$ mm Plasticity Index = 0.0% $D_{(60)} = 0.279$ $D_{(90)} = 0.733$ mm Sand Equivalent = n/a mm

Fracture %, 1 Face = n/a Fracture %, 2+ Faces = n/a

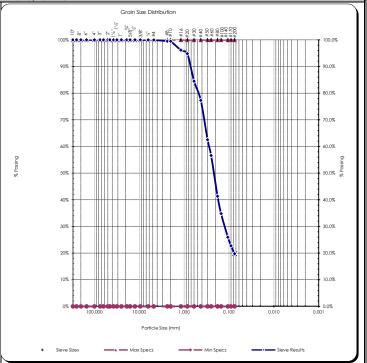
Coeff. of Curvature, $C_C = 1.50$ Coeff. of Uniformity, $C_U = 7.34$ Fineness Modulus = 1.22

Plastic Limit = 0.0% Moisture %, as sampled = 27.0% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

Reg'd Fracture %, 2+ Faces =

ASINI	C130, A	SINI	D0913,	ASIM	CII/

						- (90)	01755
						ust Ratio =	
		Actual	Interpolated	A	STM C136, AST	IM D6913	, ASTM
			Cumulative			ľ	
Siovo	Size	Percent	Percent	Specs	Specs	1	
US	Metric	Passing	Passing	Max	Min		
12.00"	300.00	1 assing	100%	100.0%	0.0%	1	10
10.00"	250.00		100%	100.0%	0.0%		
8.00"	200.00		100%	100.0%	0.0%		9
6.00"	150.00		100%	100.0%	0.0%		
4.00"	100.00		100%	100.0%	0.0%		
3.00"	75.00		100%	100.0%	0.0%		8
2.50"	63.00		100%	100.0%	0.0%		
2.00"	50.00	100%	100%	100.0%	0.0%		
1.75"	45.00		100%	100.0%	0.0%		
1.50"	37.50		100%	100.0%	0.0%		
1.25"	31.50		100%	100.0%	0.0%		
1.00"	25.00	100%	100%	100.0%	0.0%	g g	
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	
5/8"	16.00		100%	100.0%	0.0%	96	
1/2"	12.50	100%	100%	100.0%	0.0%		
3/8"	9.50	100%	100%	100.0%	0.0%		
1/4"	6.30		100%	100.0%	0.0%		
#4	4.75	100%	100%	100.0%	0.0%		
#8	2.36		100%	100.0%	0.0%		3
#10	2.00	99%	99%	100.0%	0.0%		
#16	1.18		96%	100.0%	0.0%		
#20	0.850	95%	95%	100.0%	0.0%		•
#30	0.600		85%	100.0%	0.0%		
#40	0.425	77%	77%	100.0%	0.0%		1
#50	0.300		63%	100.0%	0.0%		



0.0%

0.0%

0.0%

0.0%

0.0%

0.0%

Reviewed by: Meghan Blodgett-Carrillo

57%

19.8%

57%

41%

35%

26%

23%

19.8%

100.0%

100.0%

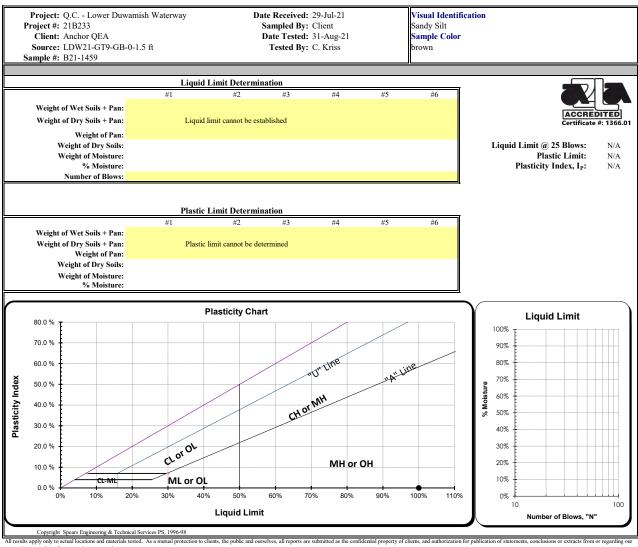
100.0%

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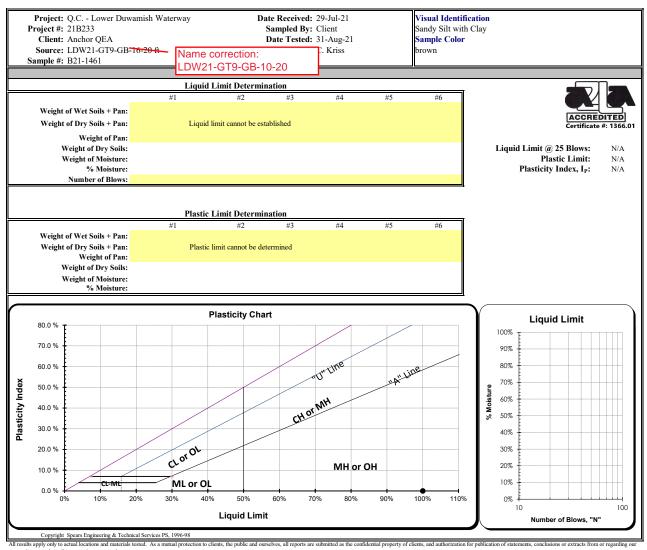


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Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the cup without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:





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Comments: Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the cup without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:

Meghan Blodgett-Carrillo



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT9-GB-20-21.5 ft Sample#: B21-1462

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 31-Aug-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color: brown

ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{c} D_{(5)} = 0.006 \\ D_{(10)} = 0.010 \\ D_{(15)} = 0.011 \\ D_{(30)} = 0.019 \\ D_{(30)} = 0.058 \\ D_{(50)} = 0.108 \\ D_{(60)} = 0.159 \\ D_{(90)} = 1.026 \\ Dust Ratio = 38/73 \\ \end{array}$ % Gravel = 1.6% % Sand = 55.5% mm % Silt & Clay = 43.0% mm Liquid Limit = n/a mm Plasticity Index = n/a mm Sand Equivalent = n/a mm

Fineness Modulus = 0.99 Plastic Limit = n/a Moisture %, as sampled = 26.8% Req'd Sand Equivalent =

Coeff. of Curvature, $C_C = 2.18$ Coeff. of Uniformity, $C_U = 16.63$

Fracture %, 1 Face = n/a Fracture %, 2+ Faces = n/a Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

				AS		ust Ratio = 38//3 Fracture %, 2+ Faces = n/a Req'd Fracture %, 2+ Faces = TM D6913, ASTM C117
		Actual	Interpolated	AS	11VI C130, AS	
			Cumulative			Grain Size Distribution
Sieve	Size	Percent	Percent	Specs	Specs	
US	Metric	Passing	Passing	Max	Min	10002 1000 4 40 10 27 4 02 2 4 02 2 2 2 2 2 2 2 2 2 2 2 2 2 2
12.00"	300.00	1 11331115	100%	100.0%	0.0%	
10.00"	250.00		100%	100.0%	0.0%	
8.00"	200.00		100%	100.0%	0.0%	90%
6.00"	150.00		100%	100.0%	0.0%	
4.00"	100.00		100%	100.0%	0.0%	
3.00"	75.00		100%	100.0%	0.0%	80%
2.50"	63.00		100%	100.0%	0.0%	
2.00"	50.00	100%	100%	100.0%	0.0%	70.0%
1.75"	45.00		100%	100.0%	0.0%	
1.50"	37.50		100%	100.0%	0.0%	
1.25"	31.50		100%	100.0%	0.0%	60%
1.00"	25.00	100%	100%	100.0%	0.0%	
3/4"	19.00	100%	100%	100.0%	0.0%	0 C C C C C C C C C C C C C C C C C C C
5/8"	16.00		100%	100.0%	0.0%	8 50% be 50.0% be 50.0% be
1/2"	12.50	100%	100%	100.0%	0.0%	
3/8"	9.50	100%	100%	100.0%	0.0%	405
1/4"	6.30		99%	100.0%	0.0%	
#4	4.75	98%	98%	100.0%	0.0%	
#8	2.36		95%	100.0%	0.0%	30%
#10	2.00	94%	94%	100.0%	0.0%	
#16	1.18		91%	100.0%	0.0%	20,0%
#20	0.850	89%	89%	100.0%	0.0%	20%
#30	0.600		85%	100.0%	0.0%	
#40	0.425	83%	83%	100.0%	0.0%	10%
#50	0.300		74%	100.0%	0.0%	
#60	0.250	70%	70%	100.0%	0.0%	
#80	0.180		62%	100.0%	0.0%	0% 000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
#100	0.150	59%	59%	100.0%	0.0%	1.000 0.100 0.001
#140	0.106		50%	100.0%	0.0%	Particle Size (mm)
#170	0.090		46%	100.0%	0.0%	
#200	0.075	43.0%	43.0%	100.0%	0.0%	+ Sieve Sizes — Max Specs — Min Specs — Sieve Results
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Reviewed by: Meghan Blodgett-Carrillo



Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Unified Soil Classification System, ASTM-2487 Project #: 21B233 Sampled By: Client SM, Silty Sand Client: Anchor QEA Date Tested: 31-Aug-21 Sample Color Source: LDW21-GT9-GB-20-21.5 ft Tested By: C. Kriss brown Sample#: B21-1462 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Assumed Sp Gr: Sieve Analysis 2.65 Sample Weight: 75.17 **Grain Size Distribution** Hydroscopic Moist.: 1.11% Soils Particle Sieve Percent Passing Adj. Sample Wgt: 74.34 grams Size Diameter 75.000 mm 3.0" 100% 2.0" 100% 50.000 mm Hydrometer Soils Particle 37.500 mm 1.5" 100% Reading Corrected Percent 1.25" 31.500 mm 100% Minutes Reading **Passing** Diameter 0.0496 mm 100% 25.000 mm 24.0% 1.0" 0.0357 mm 3/4" 16.5 20.8% 100% 19.000 mm 5 13.5 17.1% $0.0230\ mm$ 5/8" 100% 16.000 mm 15 9.5 12.0% $0.0136\ mm$ 1/2" 100% 12.500 mm 30 8 10.1% $0.0097\ mm$ 3/8" 100% 9.500 mm 60 6.3% $0.0069\ mm$ 1/4" 99% 6.300 mm 240 2.5% $0.0035 \ mm$ #4 98% 4.750 mm 1440 1.3% $0.0014\ mm$ #10 94% 2.000 mm 0.850 mm #20 89% % Gravel: Liquid Limit: n/a #40 83% 0.425 mm % Sand: 55.5% Plastic Limit: n/a #100 59% 0.150 mm % Silt: 38.8% Plasticity Index: n/a #200 43.0% 0.075 mm 42.2% 0.074 mm % Clay: 4.2% Silts 30.9% 0.050 mm 15.4% 0.020 mm 4.2% 0.005 mm Clavs 1.6% 0.002 mm Colloids 0.9% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: % Silt: 0.05 - 0.002 mm < 0.002 mm % Clay: **USDA Soil Textural Classification** Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding Comments:

Reviewed by:

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1462
Sample Date:	7/8/2021
Test Date:	8/31/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT9-GB-20-21.5 ft

 Visual Soil Description:
 brown silty sand

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

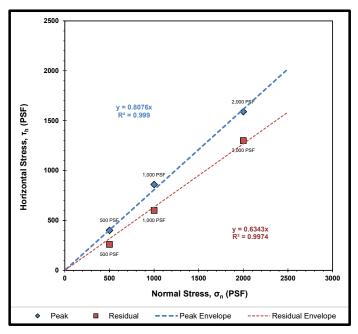
Specimen Height (in): 1
Rate of Strain (in/min): 0.0042
Estimated Specific Gravity of Solids: 2.65

Summary of Sample	Data:	σ _n =500 PSF
Initial Moisture Content (%):	22.7	
	Initial	Post-Consolidation
Dry Density (PCF):	112.8	114.5
Void Ratio:	0.494	0.471
Porosity (%):	33.0	32.0
Degree of Saturation (%):	saturated	saturated

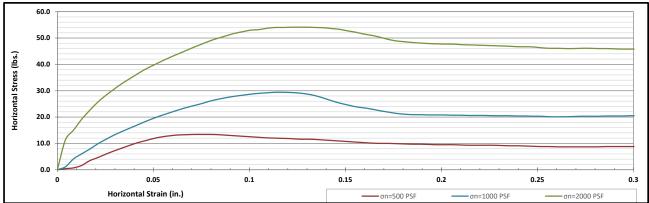
Summary of Sample	Data:	σ _n =1000 PSF
Initial Moisture Content (%):	21.4	
	Initial	Post-Consolidation
Dry Density (PCF):	113.5	120.4
Void Ratio:	0.485	0.399
Porosity (%):	32.7	28.5
Degree of Saturation (%):	saturated	saturated

Summary of Sample	Data:	σ _n =2000 PSF
Initial Moisture Content (%):	19.9	
	Initial	Post-Consolidation
Dry Density (PCF):	114.3	123.5
Void Ratio:	0.474	0.364
Porosity (%):	32.1	26.7
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS						
	PEAK	RESIDUAL				
Angle of Internal Friction, φ (°):	39	32				
Cohesion (PSF):	0	0				



Failure Envelope Test Values:				
Normal Stress, σ _n (PSF):	500	1000	2000	
Peak Horizontal Stress, τ _h (PSF):	400	860	1590	
Residual Horizontal Stress, τ _h (PSF):	260	600	1300	





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT7-GB-0-5.7 ft Sample#: B21-1464

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 31-Aug-21

Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SP-SM, Poorly graded Sand with Silt

Sample Color:

mm

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Cmass

No Specs

#16

#20

#30

#40

#50

#60

#80

#100

#140

#170

#200

1.18

0.850

0.600

0.425

0.300

0.250

0.180

0.150

0.106

0.090

0.075

Meghan Blodgett-Carrillo

Sample Meets Specs? N/A

 $D_{(5)} = 0.066$ $D_{(10)} = 0.135$ $D_{(15)} = 0.170$ % Gravel = 0.2% % Sand = 94.1% mm % Silt & Clay = 5.6% mm $D_{(30)} = 0.247$ Liquid Limit = 0.0% mm $D_{(50)} = 0.327$ Plasticity Index = 0.0% $D_{(60)} = 0.367$ mm Sand Equivalent = n/a

Fracture %, 1 Face = n/a Fracture %, 2+ Faces = n/a

Coeff. of Curvature, $C_C = 1.24$ Coeff. of Uniformity, $C_U = 2.73$ Fineness Modulus = 1.68

Plastic Limit = 0.0% Moisture %, as sampled = 29.1% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

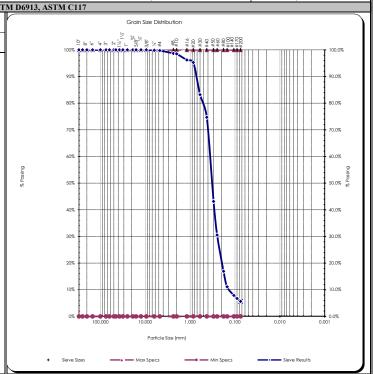
Reg'd Fracture %, 2+ Faces =

$D_{(60)} = 0.367$						
$D_{(90)} = 0.741$						
ast Ratio = 4/53						
TM D6913, ASTM	TM C136, AST	AS				
			Interpolated	Actual		
	ı		Cumulative	1		
	Specs	Specs	Percent	Percent		Sieve
1	Min	Max	Passing	Passing	Metric	US
	0.0%	100.0%	100%		300.00	12.00"
	0.0%	100.0%	100%		250.00	10.00"
	0.0%	100.0%	100%		200.00	8.00"
	0.0%	100.0%	100%		150.00	6.00"
	0.0%	100.0%	100%		100.00	4.00"
	0.0%	100.0%	100%		75.00	3.00"
	0.0%	100.0%	100%		63.00	2.50"
	0.0%	100.0%	100%	100%	50.00	2.00"
	0.0%	100.0%	100%		45.00	1.75"
	0.0%	100.0%	100%		37.50	1.50"
	0.0%	100.0%	100%		31.50	1.25"
Di Ci	0.0%	100.0%	100%	100%	25.00	1.00"
% Possing	0.0%	100.0%	100%	100%	19.00	3/4"
96	0.0%	100.0%	100%		16.00	5/8"
	0.0%	100.0%	100%	100%	12.50	1/2"
	0.0%	100.0%	100%	100%	9.50	3/8"
	0.0%	100.0%	100%		6.30	1/4"
	0.0%	100.0%	100%	100%	4.75	#4
	0.0%	100.0%	99%		2.36	#8
	0.0%	100.0%	99%	99%	2.00	#10
II .	1 1 1 1 1 1		1.50			

95%

75%

31%



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Comments: Reviewed by:

96%

95%

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43%

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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT7-GB-8.5-18.5 ft **Sample#:** B21-1466

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 31-Aug-21 Tested By: C. Kriss Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color: brown ACCREDITED
Certificate #: 1366.01

ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

0.425

0.300

0.250

0.180

0.150

0.106

0.090

0.075

#40 #50

#60

#80

#100

#140

#170

#200

Comments:

Sample Meets Specs? N/A

 $D_{(5)} = 0.022$ $D_{(10)} = 0.063$ $D_{(15)} = 0.080$ % Gravel = 0.2% % Sand = 85.4% mm % Silt & Clay = 14.4% mm $D_{(30)} = 0.186$ Liquid Limit = n/a mm $D_{(50)} = 0.299$ mm Plasticity Index = n/a $D_{(60)} = 0.354$ mm Sand Equivalent = n/a Fracture %, 1 Face = n/a Fracture %, 2+ Faces = n/a $D_{(90)} = 0.799$ mm

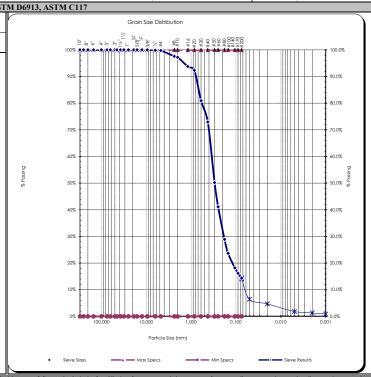
Coeff. of Curvature, C_C = 1.55 Coeff. of Uniformity, C_U = 5.61 Fineness Modulus = 1.54 Plastic Limit = n/a Moisture %, as sampled = 33.4%

Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Reg'd Fracture %, 2+ Faces =

						(20)	0.177
							13/66
		Actual Cumulativ	Interpolated e Cumulative	AS	STM C136, AS	FM D6913,	ASTM
Sieve	Size	Percent	Percent	Specs	Specs		
US	Metric	Passing	Passing	Max	Min		1
12.00"	300.00		100%	100.0%	0.0%		
10.00"	250.00		100%	100.0%	0.0%		
8.00"	200.00		100%	100.0%	0.0%		
6.00"	150.00		100%	100.0%	0.0%		
4.00"	100.00		100%	100.0%	0.0%		
3.00"	75.00		100%	100.0%	0.0%		
2.50"	63.00		100%	100.0%	0.0%		
2.00"	50.00	100%	100%	100.0%	0.0%		
1.75"	45.00		100%	100.0%	0.0%		
1.50"	37.50		100%	100.0%	0.0%		
1.25"	31.50		100%	100.0%	0.0%		
1.00"	25.00	100%	100%	100.0%	0.0%	p	
3/4"	19.00	100%	100%	100.0%	0.0%	% Possing	
5/8"	16.00		100%	100.0%	0.0%	₩.	
1/2"	12.50	100%	100%	100.0%	0.0%		
3/8"	9.50	100%	100%	100.0%	0.0%		
1/4"	6.30		100%	100.0%	0.0%		
#4	4.75	100%	100%	100.0%	0.0%		
#8	2.36		98%	100.0%	0.0%		
#10	2.00	97%	97%	100.0%	0.0%		
#16	1.18		94%	100.0%	0.0%		
#20	0.850	92%	92%	100.0%	0.0%		
#30	0.600		81%	100.0%	0.0%		

73%

41%



Il results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval

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Reviewed by:

Meghan Blodgett-Carrillo

73%

50%

41%

29%

24%

18%

16%

14.4%

100.0%

100.0%

100.0%

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100.0%



Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Unified Soil Classification System, ASTM-2487 Project #: 21B233 Sampled By: Client SM, Silty Sand Client: Anchor QEA Date Tested: 31-Aug-21 Sample Color Source: LDW21-GT7-GB-8.5-18.5 ft Tested By: C. Kriss brown Sample#: B21-1466 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Assumed Sp Gr: Sieve Analysis 2.65 75.16 Sample Weight: **Grain Size Distribution** Hydroscopic Moist.: 1.29% Soils Particle Sieve Percent ACCREDITED Passing Adj. Sample Wgt: 74.20 grams Size Diameter 75.000 mm 3.0" 100% 2.0" 100% 50.000 mm Hydrometer Soils Particle 37.500 mm 1.5" 100% Reading Corrected Percent 1.25" 31.500 mm 100% Minutes Reading **Passing** Diameter 0.0537 mm 100% 25.000 mm 6.6% 1.0" 0.0381 mm 3/4" 4.5 5.9% 100% 19.000 mm 5 4 5.2% $0.0241\ mm$ 5/8" 100% 16.000 mm 15 3.9% $0.0140\ mm$ 1/2" 100% 12.500 mm 30 2.5 3.3% $0.0100\ mm$ 3/8" 100% 9.500 mm 60 2 2.6% $0.0070\ mm$ 1/4" 100% 6.300 mm 240 1.3% $0.0035 \ mm$ #4 100% 4.750 mm 1440 1.3% $0.0014\ mm$ #10 97% 2.000 mm 0.850 mm #20 92% % Gravel: 0.2% Liquid Limit: n/a #40 73% 0.425 mm % Sand: 85.4% Plastic Limit: n/a #100 24% 0.150 mm % Silt: 12.5% Plasticity Index: n/a #200 14.4% 0.075 mm 0.074 mm % Clay: 1.9% 14.0% 0.050 mm 6.5% 4.7% 0.020 mm 1.9% 0.005 mm Clavs 1.3% 0.002 mm Colloids 0.9% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: % Silt: 0.05 - 0.002 mm < 0.002 mm % Clay: **USDA Soil Textural Classification** All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding **Comments:**

Reviewed by:

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1466
Sample Date:	7/9/2021
Test Date:	9/1/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT7-GB-8.5-18.5 ft

 Visual Soil Description:
 brown silty sand

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

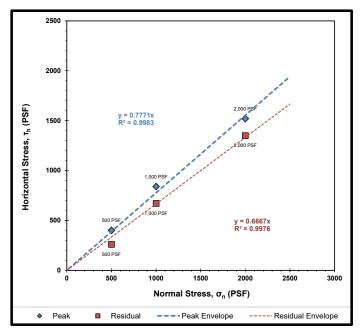
Specimen Height (in): 1
Rate of Strain (in/min): 0.0208
Estimated Specific Gravity of Solids: 2.65

Summary of Sample	Data:	σ _n =500 PSF
Initial Moisture Content (%):	36.5	
	Initial	Post-Consolidation
Dry Density (PCF):	99.2	102.6
Void Ratio:	0.698	0.642
Porosity (%):	41.1	39.1
Degree of Saturation (%):	saturated	saturated

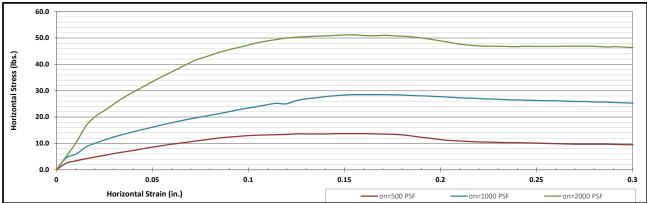
Summary of Samp	σ _n =1000 PSF	
Initial Moisture Content (%): 37.7		
	Initial	Post-Consolidation
Dry Density (PCF):	97.5	105.0
Void Ratio:	0.728	0.605
Porosity (%):	42.1	37.7
Degree of Saturation (%):	saturated	saturated

Summary of Sample	Data:	σ _n =2000 PSF
Initial Moisture Content (%): 36.6		
	Initial	Post-Consolidation
Dry Density (PCF):	99.4	106.9
Void Ratio:	0.694	0.576
Porosity (%):	41.0	36.5
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS			
	PEAK	RESIDUAL	
Angle of Internal Friction, φ (°):	38	34	
Cohesion (PSF):	0	0	



Failure Envelope Test Values:					
Normal Stress, σ _n (PSF):	500	1000	2000		
Peak Horizontal Stress, τ _h (PSF):	400	840	1520		
Residual Horizontal Stress, τ _h (PSF):	260	670	1350		





Corporate • 777 Chrysler Drive • Burlington, WA 98233 • Phone 360.755.1990 • Fax 360.755.1980 SW Region • 2118 Black Lake Blvd. S.W.• Olympia, WA 98512 • Phone 360.534.9777 • Fax 360.534.9779 NW Region • 805 Dupont, Suite #5 • Bellingham, WA 98225 • Phone 360.647.6061 • Fax 360.647.8111 Kitsap Region • 5451 N.W. Newberry Hill Road, Suite 101 • Silverdale, WA 98383 • Phone/Fax 360.698.6787



Client:	Anchor QEA	Date:	September 30, 2021
Address:	21328 2nd Drive SE	Project:	Q.C Lower Duwamish Waterway
	Bothell, WA 98021	Project #:	21B233
Attn:	Garrett Timm	Sample #:	B21-1535-1552
Revised on:		Date sampled:	July 9, 2021

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	Please See Attached Reports		Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count			LA Abrasion	
X	Moisture Content	Please See Attached Report	X	Direct Shear	Please See Attached Reports
	Specific Gravity, Coarse		X	Specific Gravity, Soils	Please See Attached Reports
	Specific Gravity, Fine				
X	Hydrometer Analysis	Please See Attached Reports			
X	Atterberg Limits	Please See Attached Reports			

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted, Meghan Blodgett-Carrillo

WABO Supervising Laboratory Technician



Moisture Content - ASTM C566, ASTM D2216

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: September 1, 2021	Tested by: A. Eifrig

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B21-1535	LDW21-GT7-GB-5.7-8.5 ft	220.0	955.7	691.6	264.1	471.6	56.0%
B21-1536	LDW21-GT7-GB-18.5-23.5 ft	233.7	1022.0	763.2	258.8	529.5	48.9%
B21-1537	LDW21-GT7-GB-23.5-25 ft	229.6	808.5	686.6	121.9	457.0	26.7%
B21-1538	LDW21-GT3-GB-0-1.5 ft	222.7	822.9	608.9	214.0	386.2	55.4%
B21-1539	LDW21-GT3-GB-0-8 ft	223.1	775.1	560.8	214.3	337.7	63.5%
B21-1540	LDW21-GT3-GB-8-9.5 ft	235.0	596.2	499.4	96.8	264.4	36.6%
B21-1541	LDW21-GT3-GB-13.6-18 ft	224.3	840.2	686.6	153.6	462.3	33.2%
B21-1542	LDW21-GT3-GB-18-19.5 ft	208.8	713.1	597.6	115.5	388.8	29.7%
B21-1543	LDW21-GT2-GB-0-1.5 ft	221.9	1015.5	706.7	308.8	484.8	63.7%
B21-1544	LDW21-GT2-GB-0-9 ft	221.9	1057.2	726.4	330.8	504.5	65.6%
B21-1545	LDW21-GT2-GB-9-10.5 ft	234.7	881.9	693.4	188.5	458.7	41.1%
B21-1546	LDW21-GT2-GB-16-19ft	319.9	776.4	594.5	181.9	274.6	66.2%
B21-1547	LDW21-GT1-GB-19-20.5 ft	268.9	932.1	798.3	133.8	529.4	25.3%
B21-1548	LDW21-GT1-GB-0-1.5 ft	270.2	991.8	734.1	257.7	463.9	55.6%
B21-1549	LDW21-GT1-GB-0-10 ft	266.5	951.7	694.7	257.0	428.2	60.0%
B21-1550	LDW21-GT1-GB-10-11.5 ft	303.8	1160.1	875.7	284.4	571.9	49.7%
B21-1551	LDW21-GT1-GB-10-20 ft	311.0	1013.9	756.9	257.0	445.9	57.6%
B21-1552	LDW21-GT1-GB-20-21.5 ft	306.5	1105.1	926.6	178.5	620.1	28.8%
				f disease and seek signals			

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:



Moisture Content - ASTM D854

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: September 1, 2021	Tested by: A. Eifrig

I		I	I	I			Ī	I	Mass of		I			l I
										Mass of			Temp.	1
			Dry Soil +	Mass of Dry		Mass of	Volume of	Density of	w/ water &	Pycno filled			Correction	Corrected
Sample #	Location	Tare	Tare	Soil	Pycno ID	Pycno	Pycno	Water @ Tx	soils	w/ water	*C	Soils	Factor	SpG
B21-1536	LDW21-GT7-GB-18.5-23.5 ft	414.24	485.84	71.6	TSA-010	180.3	499.5	0.99752	753.80	709.46		2.6265591	0.99931	2.6247467
B21-1541	LDW21-GT3-GB-13.6-18 ft	379.79	481.87	102.1	TSA-011	190.3	499.5	0.99749	752.15	688.62		2.6482538		2.6463735
B21-1546	LDW21-GT2-GB-16-19ft	417.55	468.99	51.4	TSA-017	187.9	499.4	0.99754	717.30	686.06	23.0	2.546361		2.5446549
B21-1549	LDW21-GT1-GB-0-10 ft	411.71	488.70	77.0	TSA-022	198.0	499.5	0.99749	742.60	696.19		2.5179566		2.5161689
B21-1551	LDW21-GT1-GB-10-20 ft	380.03	474.50	94.5	TSA-020	195.0	499.5	0.99749	750.48	693.27	23.2	2.5356867	0.99929	2.5338864
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All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:

Meghan Blodgett-Carrillo



Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Visual Identification Sampled By: Client Sand with Silt and Clay **Project #:** 21B233 Client: Anchor QEA Date Tested: 1-Sep-21 Sample Color Source: LDW21-GT7-GB-5.7-8.5 ft Tested By: C. Kriss Sample #: B21-1535 **Liquid Limit Determination** Weight of Wet Soils + Pan: 34.38 32.59 32.44 Weight of Dry Soils + Pan: 30.26 28.85 28.70 Weight of Pan: 19 73 19 58 19 89 Liquid Limit @ 25 Blows: Weight of Dry Soils: 10.68 9.12 8.81 40 % Plastic Limit: Plasticity Index, I_P: Weight of Moisture: % Moisture: 4 12 3 74 3 74 N/A 38.6 % 41.0 % 42.5 % N/A Number of Blows: **Plastic Limit Determination** #2 Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Plastic limit cannot be determined Weight of Pan: Weight of Dry Soils: Weight of Moisture: % Moisture: **Plasticity Chart Liquid Limit** 80.0 % 100% 70.0 % 90% 60.0 % A" Line Plasticity Index 50.0 % 60% 40.0 % 50% 30.0 % CL or OL MH or OH 20% 10.0 % ML or OL 10% 100% 10 100 **Liquid Limit** Copyright Spears Engineering & Technical Services PS, 1996-98

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our

Comments: Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT7-GB-18.5-23.5 ft

Sample#: B21-1536

#170

#200

Reviewed by:

0.090

0.075

43.5%

Meghan Blodgett-Carrillo

49%

43.5%

100.0%

100.0%

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 1-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

mm

brown

30.0%

ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{AS IM D43} \\ \textbf{D}_{(5)} = 0.009 \\ \textbf{D}_{(10)} = 0.017 \\ \textbf{D}_{(15)} = 0.026 \\ \textbf{D}_{(30)} = 0.052 \\ \textbf{D}_{(50)} = 0.094 \\ \textbf{D}_{(60)} = 0.122 \\ \textbf{D}_{(90)} = 0.372 \end{array}$ mm % Gravel = 0.1% % Sand = 56.4% mm % Silt & Clay = 43.5% mm mm Liquid Limit = 0.0% mm Plasticity Index = 0.0% mm

Sand Equivalent = n/a
Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 1.27$ Coeff. of Uniformity, $C_U = 7.08$ Fineness Modulus = 0.55

Plastic Limit = 0.0% Moisture %, as sampled = 48.9% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = eq'd Fracture %, 2+ Faces =

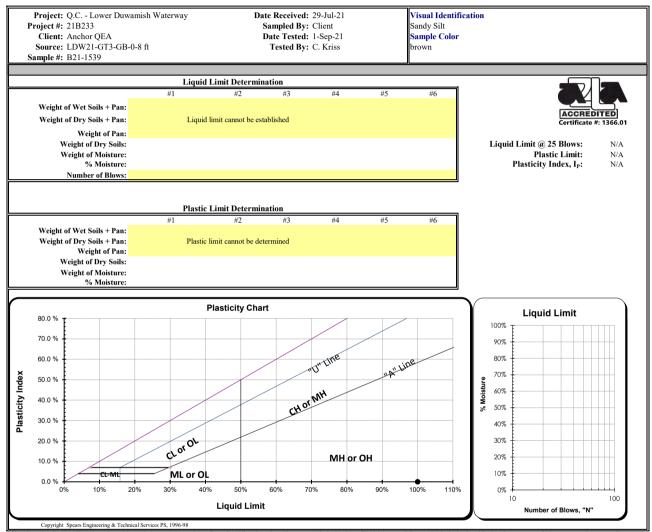
						$D_{(90)} = 0.372$	mm		acture %,				Re
						Oust Ratio = $11/24$		Frac	ture %, 2+	- Faces =	n/a		Req'
				AS	STM C136, AS	TM D6913, AST	M C117						
		Actual	Interpolated					(Grain Size Dist	tribution			
CI.	~	,	Cumulative	-		-		₹					
Sieve		Percent	Percent	Specs	Specs			49977	5/8''. 3/8'' 1/4''	e2 9	8 4 9 9 9	88888	38
US 12.00"	Metric 300.00	Passing	Passing 100%	Max 100.0%	Min 0.0%	-	100%		****		***	++++	Ħ
10.00"	250.00		100%	100.0%	0.0%						*+++		
8.00"	200.00		100%	100.0%	0.0%		90%				\		
6.00"	150.00		100%	100.0%	0.0%		70,0						
4.00"	100.00		100%	100.0%	0.0%						,		
			100%				80%			++-+		\	####
3.00" 2.50"	75.00		100%	100.0% 100.0%	0.0%							ı N	
2.00"	63.00	100%	100%	100.0%	0.0%							\	
	50.00	100%			0.0%		70%		1	++-+	#####		mm
1.75"	45.00		100%	100.0%	0.0%							 	
1.50"	37.50		100%	100.0%	0.0%		60%					. N	
1.25"	31.50		100%	100.0%	0.0%		00%						
1.00"	25.00	100%	100%	100.0%	0.0%	% Passing						}	
3/4"	19.00	100%	100%	100.0%	0.0%	P6 0	50%					\longrightarrow	/
5/8"	16.00		100%	100.0%	0.0%								1
1/2"	12.50	100%	100%	100.0%	0.0%								*
3/8"	9.50	100%	100%	100.0%	0.0%		40%						++++
1/4"	6.30		100%	100.0%	0.0%								
#4	4.75	100%	100%	100.0%	0.0%								
#8	2.36		100%	100.0%	0.0%		30%					ПП	Ш
#10	2.00	100%	100%	100.0%	0.0%								
#16	1.18		97%	100.0%	0.0%		20%				ЩЩ	└	ШШ
#20	0.850		96%	100.0%	0.0%								
#30	0.600		95%	100.0%	0.0%		H						
#40	0.425	95%	95%	100.0%	0.0%		10%			HHHH		+	₩₩
#50	0.300		83%	100.0%	0.0%								
#60	0.250		79%	100.0%	0.0%								
#80	0.180		72%	100.0%	0.0%		0%	100.000	10.000	1.0	00	0.10	00
#100	0.150	70%	70%	100.0%	0.0%								
#140	0.106		54%	100.0%	0.0%				Particle	le Size (mm)			

Comments:

0.0%

0.0%





All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding or reports is reserved pending our writing approval.

Comments: Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the liquid limit device without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT3-GB-8-9.5 ft

Sample#: B21-1540

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 1-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487 SM, Silty Sand

Sample Color: brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

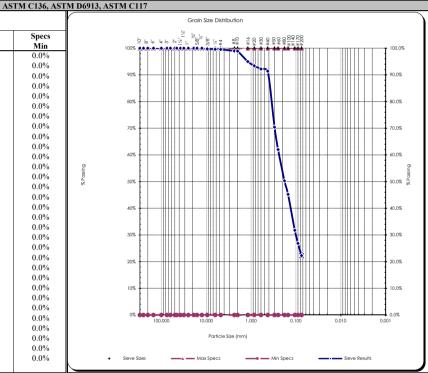
Specifications No Specs Sample Meets Specs? N/A

 $\begin{array}{c} D_{(5)} = 0.017 \\ D_{(10)} = 0.034 \\ D_{(15)} = 0.051 \\ D_{(30)} = 0.100 \end{array}$ mm % Gravel = 0.5% % Sand = 77.3% mm % Silt & Clay = 22.3% mm mm Liquid Limit = 0.0% $D_{(50)} = 0.178$ Plasticity Index = 0.0% $D_{(60)} = 0.238$ mm Sand Equivalent = n/a $D_{(90)} = 0.417$ Dust Ratio = 19/78 mm Fracture %, 1 Face = n/a Fracture %, 2+ Faces = n/a

Fineness Modulus = 0.99 Plastic Limit = 0.0% Moisture %, as sampled = 36.6% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

Coeff. of Curvature, $C_C = 1.25$ Coeff. of Uniformity, $C_U = 7.06$

		Actual	Interpolated		
			Cumulative		
Sieve	Size	Percent	Percent	Specs	Specs
US	Metric	Passing	Passing	Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		99%	100.0%	0.0%
#10	2.00	99%	99%	100.0%	0.0%
#16	1.18		95%	100.0%	0.0%
#20	0.850		93%	100.0%	0.0%
#30	0.600		92%	100.0%	0.0%
#40	0.425	91%	91%	100.0%	0.0%
#50	0.300		70%	100.0%	0.0%
#60	0.250		62%	100.0%	0.0%
#80	0.180		50%	100.0%	0.0%
#100	0.150	45%	45%	100.0%	0.0%
#140	0.106		32%	100.0%	0.0%
#170	0.090		27%	100.0%	0.0%
#200	0.075	22.3%	22.3%	100.0%	0.0%



Comments: Reviewed by: Meghan Blodgett-Carrillo

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1540
Sample Date:	7/9/2021
Test Date:	9/24/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT3-GB-8-9.5 ft

 Visual Soil Description:
 brown silty sand

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

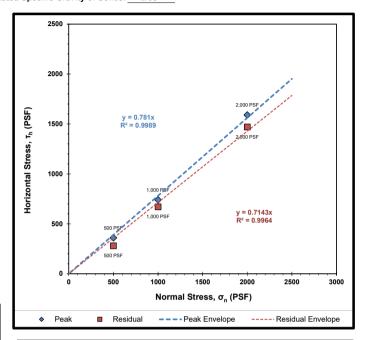
Specimen Height (in): 1
Rate of Strain (in/min): 0.0208
Estimated Specific Gravity of Solids: 2.65

Summary of Sampl	e Data:	σ _n =500 PSF	
Initial Moisture Content (%):	33.7		
	Initial	Post-Consolidation	
Dry Density (PCF):	102.4	104.0	
Void Ratio:	0.645	0.620	
Porosity (%):	39.2	38.3	
Degree of Saturation (%):	saturated	saturated	

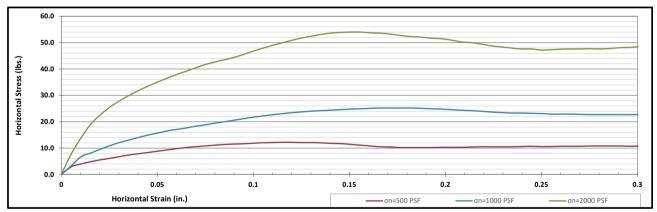
Summary of Sample	Data:	σ _n =1000 PSF
Initial Moisture Content (%):	31.2	
	Initial	Post-Consolidation
Dry Density (PCF):	104.0	109.1
Void Ratio:	0.620	0.544
Porosity (%):	38.3	35.2
Degree of Saturation (%):	saturated	saturated

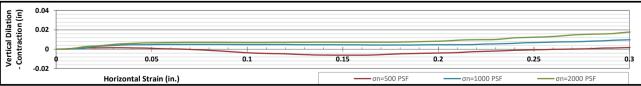
Summary of Samp	le Data:	σ _n =2000 PSF		
Initial Moisture Content (%):	30.1			
	Initial	Post-Consolidation		
Dry Density (PCF):	105.0	110.4		
Void Ratio:	0.605	0.526		
Porosity (%):	37.7	34.5		
Degree of Saturation (%):	saturated	saturated		

ESTIMATED STRENGTH PARAMETERS							
	PEAK	RESIDUAL					
Angle of Internal Friction, φ (°):	38	36					
Cohesion (PSF):	0	0					



Failure Envelope Test Values:								
Normal Stress, σ _n (PSF):	500	1000	2000					
Peak Horizontal Stress, τ _h (PSF):	360	740	1590					
Residual Horizontal Stress, τ _h (PSF):	280	670	1470					





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT3-GB-13.6-18 ft

Sample#: B21-1541

#50

#60

#80

#100

#140

#170

#200

0.300

0.250

0.180

0.150

0.106

0.090

0.075

-15.2%

Meghan Blodgett-Carrillo

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 1-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SP, Poorly graded Sand

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281 mm

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{c} D_{(5)} = 0.140 \\ D_{(10)} = 0.157 \\ D_{(15)} = 0.176 \\ D_{(30)} = 0.234 \end{array}$ mm mm mm $D_{(50)} = 0.311$ $D_{(60)} = 0.349$ mm $D_{(90)} = 1.234$ st Ratio = - 17/89 mm

Liquid Limit = n/a Plasticity Index = n/aSand Equivalent = n/a Fracture %, 1 Face = n/aFracture %, 2+ Faces = n/a

% Gravel = 0.2%

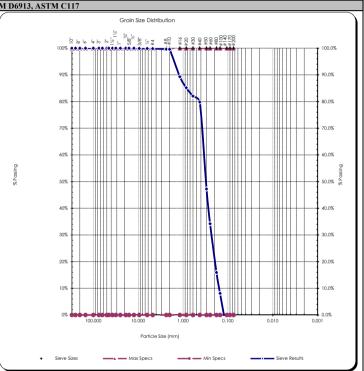
% Silt & Clay = -15.2%

% Sand = 115.1%

Coeff. of Curvature, $C_C = 1.00$ Coeff. of Uniformity, $C_U = 2.22$ Fineness Modulus = 1.74 Plastic Limit = n/a

Moisture %, as sampled = 33.2% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

		Actual Cumulative	Interpolated Cumulative	AS	TM C136,	
Sieve	Size	Percent	Percent	Specs	Specs	
US	Metric	Passing	Passing	Max	Min	
12.00"	300.00		100%	100.0%	0.0%	
10.00"	250.00		100%	100.0%	0.0%	
8.00"	200.00		100%	100.0%	0.0%	
6.00"	150.00		100%	100.0%	0.0%	
4.00"	100.00		100%	100.0%	0.0%	
3.00"	75.00		100%	100.0%	0.0%	
2.50"	63.00		100%	100.0%	0.0%	
2.00"	50.00	100%	100%	100.0%	0.0%	
1.75"	45.00		100%	100.0%	0.0%	
1.50"	37.50		100%	100.0%	0.0%	
1.25"	31.50		100%	100.0%	0.0%	
1.00"	25.00	100%	100%	100.0%	0.0%	
3/4"	19.00	100%	100%	100.0%	0.0%	
5/8"	16.00		100%	100.0%	0.0%	
1/2"	12.50	100%	100%	100.0%	0.0%	
3/8"	9.50	100%	100%	100.0%	0.0%	
1/4"	6.30		100%	100.0%	0.0%	
#4	4.75	100%	100%	100.0%	0.0%	
#8	2.36		100%	100.0%	0.0%	
#10	2.00	100%	100%	100.0%	0.0%	
#16	1.18		89%	100.0%	0.0%	
#20	0.850		85%	100.0%	0.0%	
#30	0.600		82%	100.0%	0.0%	
#40	0.425	80%	80%	100.0%	0.0%	



0.0%

0.0%

0.0%

0.0%

0.0%

0.0%

0.0%

Comments: Reviewed by:

47%

34%

16%

8%

-6%

-11%

-15.2%

100.0%

100.0%

100.0%

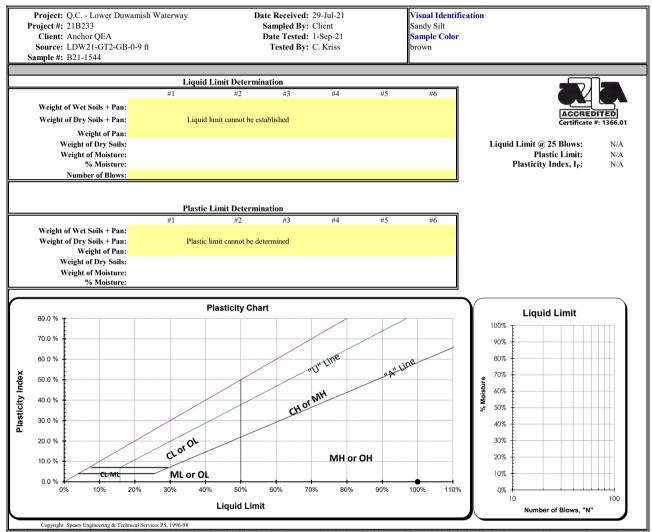
100.0%

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100.0%





All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding or reports is reserved pending our writing approval.

Comments: Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the liquid limit device without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Reviewed by:

Meghan Blodgett-Carrillo

Source: LDW21-GT2-GB-16-19 ft

Source: LDW21-G12-G Sample#: B21-1546 Date Received: 29-Jul-21 Sampled By: Client Date Tested: 1-Sep-21 Tested By: C. Kriss Visual Identification Sandy Silt with Clay Sample Color: brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Specs

Sample Meets Specs? N/A

Fineness Modulus = 0.28
Plastic Limit = n/a
Moisture %, as sampled = 66.2%
Req'd Sand Equivalent =

Coeff. of Curvature, $C_C = 1.57$ Coeff. of Uniformity, $C_U = 12.88$

					D	ust Ratio = 25/39	Fracture %, 2+ Faces = n/a	Req'd Fracture %, 2+ Faces =
				AS	STM C136, AS	FM D6913, ASTM C117		
		Actual	Interpolated				Grain Size Distribution	
		Cumulative	Cumulative					
Sieve	Size	Percent	Percent	Specs	Specs	b : :	3.7. 2.7. 2.7. 2.7. 2.7. 2.7. 2.7. 2.7.	88458
US	Metric	Passing	Passing	Max	Min	100%	- * * * * * * * * * * * * * * * * * * *	* * # # # # 100.0%
12.00"	300.00		100%	100.0%	0.0%			
10.00"	250.00		100%	100.0%	0.0%		<u></u>	
8.00"	200.00		100%	100.0%	0.0%	90%		90.0%
6.00"	150.00		100%	100.0%	0.0%			<u> </u>
4.00"	100.00		100%	100.0%	0.0%	80%		80.0%
3.00"	75.00		100%	100.0%	0.0%	00% F		80.0%
2.50"	63.00		100%	100.0%	0.0%	I		
2.00"	50.00	100%	100%	100.0%	0.0%	70%		70.0%
1.75"	45.00		100%	100.0%	0.0%			
1.50"	37.50		100%	100.0%	0.0%			
1.25"	31.50		100%	100.0%	0.0%	60%		60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	2		
3/4"	19.00	100%	100%	100.0%	0.0%	P. 20%		50.0%
5/8"	16.00		100%	100.0%	0.0%	be 30%		* 30.0% be
1/2"	12.50	100%	100%	100.0%	0.0%			
3/8"	9.50	100%	100%	100.0%	0.0%	40%		40.0%
1/4"	6.30		100%	100.0%	0.0%			
#4	4.75	100%	100%	100.0%	0.0%			
#8	2.36		99%	100.0%	0.0%	30%		30.0%
#10	2.00	99%	99%	100.0%	0.0%			
#16	1.18		99%	100.0%	0.0%	20%		20.0%
#20	0.850		99%	100.0%	0.0%	20%		20.0%
#30	0.600		99%	100.0%	0.0%	l Fi		
#40	0.425	99%	99%	100.0%	0.0%	10%		10.0%
#50	0.300		92%	100.0%	0.0%			
#60	0.250		89%	100.0%	0.0%			
#80	0.180		85%	100.0%	0.0%	0%	00.000 10.000 1.000	0.100 0.010 0.001
#100	0.150	84%	84%	100.0%	0.0%			
#140	0.106		72%	100.0%	0.0%		Particle Size (mm)	
#170	0.090		67%	100.0%	0.0%			
#200	0.075	63.3%	63.3%	100.0%	0.0%	+ Sieve Sizes	—▲ — Max Specs — — Min	Specs Sieve Results
Copyright	Spears Engineering & Te	chnical Services PS, 1996-9	98	1				

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Comments:

Magh Blaket aille



Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Visual Identification **Project #:** 21B233 Sandy Silt with Clay Sampled By: Client Client: Anchor QEA Date Tested: 1-Sep-21 Sample Color Source: LDW21-GT2-GB-16-19 ft Tested By: C. Kriss brown Sample#: B21-1546 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Sp Gr: Sieve Analysis 2.54 Sample Weight: 75.85 **Grain Size Distribution** Hydroscopic Moist .: 6.24% Soils Particle Sieve Percent ACCREDITED Adj. Sample Wgt: 71.39 Size Passing Diameter 3.0" 100% 75.000 mm 2.0" 100% 50.000 mm Hydrometer Soils Particle 1.5" Reading Corrected Percent 100% 37.500 mm Minutes 1.25" 100% 31.500 mm Reading Passing Diameter 25.000 mm 38.7% 0.0494 mm 27 1.0" 100% 2 23.5 33.7% $0.0358\ mm$ 3/4" 100% 19.000 mm 20.5 29.4% 0.0231 mm 5/8" 100% 16.000 mm 20.8% 0.0138 mm 1/2" 100% 12.500 mm 30 16.5% 0.0099 mm 3/8" 100% 9.500 mm 11.5 12.9% 0.0071 mm 60 1/4" 100% 6.300 mm 240 6.4% 0.0036 mm 100% 4.750 mm 4.5 #4 2.1% 0.0015 mm #10 99% 2.000 mm 1440 #20 99% 0.850 mm 0.3% Liquid Limit: n/a % Gravel: #40 99% 0.425 mm % Sand: 36.4% Plastic Limit: n/a #100 84% 0.150 mm % Silt: 54.3% Plasticity Index: n/a #200 63.3% 0.075 mm 0.074 mm % Clay: 9.0% Silts 62.3% 47.6% 0.050 mm 0.020 mm 26.5% 9.0% 0.005 mm Clays 3.1% $0.002 \ mm$ Colloids 1.4% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: 2.0 - 0.05 mm 0.05 - 0.002 mm % Silt: < 0.002 mm % Clay: **USDA Soil Textural Classification** Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval. **Comments:**

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Reviewed by:

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1546
Sample Date:	7/9/2021
Test Date:	9/27/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT2-GB-16-19 ft

 Visual Soil Description:
 brown sandy silt

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

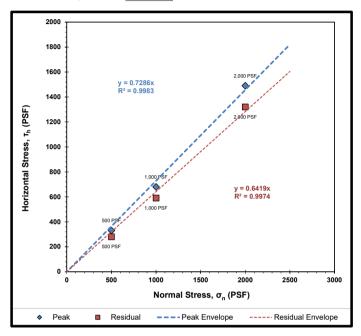
Specimen Height (in): 1
Rate of Strain (in/min): 0.0042
Estimated Specific Gravity of Solids: 2.65

Summary of Samp	σ _n =500 PSF	
Initial Moisture Content (%):	38.6	
	Initial	Post-Consolidation
Dry Density (PCF):	100.0	106.5
Void Ratio:	0.684	0.581
Porosity (%):	40.6	36.8
Degree of Saturation (%):	saturated	saturated

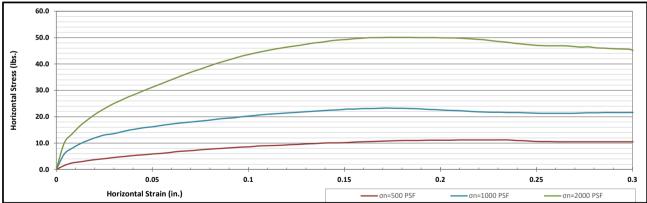
Summary of Sample	Data:	σ _n =1000 PSF
Initial Moisture Content (%):	36.2	
	Initial	Post-Consolidation
Dry Density (PCF):	101.4	111.3
Void Ratio:	0.661	0.514
Porosity (%):	39.8	34.0
Degree of Saturation (%):	saturated	saturated

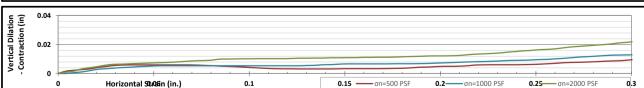
Summary of Sample	e Data:	σ _n =2000 PSF
Initial Moisture Content (%):	34.6	
	Initial	Post-Consolidation
Dry Density (PCF):	102.5	110.5
Void Ratio:	0.643	0.525
Porosity (%):	39.1	34.4
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS				
	PEAK	RESIDUAL		
Angle of Internal Friction, φ (°):	36	33		
Cohesion (PSF):	0	0		



Failure Envelope Test Values:					
Normal Stress, σ _n (PSF):	500	1000	2000		
Peak Horizontal Stress, τ _h (PSF):	330	680	1490		
Residual Horizontal Stress, τ _h (PSF):	280	590	1320		

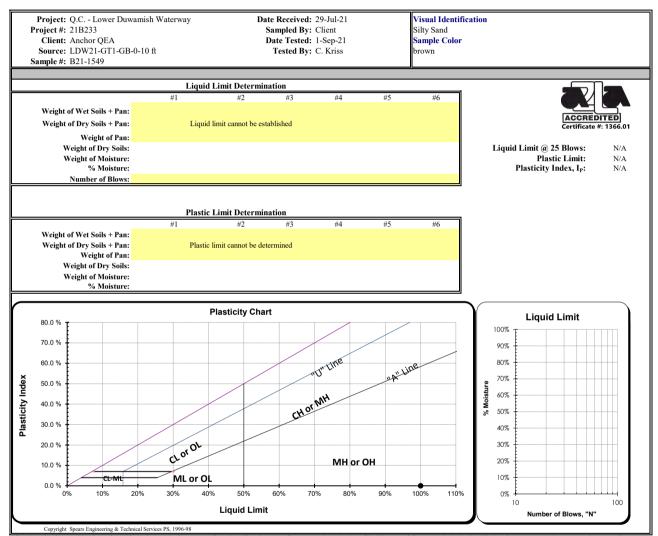




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ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils



All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding or reports is reserved pending our writing approval.

Comments: Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the liquid limit device without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT1-GB-10-20 ft

Sample#: B21-1551

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 1-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

brown

ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{l} \textbf{ASIM D431} \\ D_{(5)} = 0.013 \\ D_{(10)} = 0.037 \\ D_{(15)} = 0.059 \\ D_{(30)} = 0.072 \\ D_{(50)} = 0.106 \\ D_{(60)} = 0.125 \\ D_{(90)} = 0.327 \\ \end{array}$ mm % Gravel = 0.5% % Sand = 66.2% mm % Silt & Clay = 33.4% mm mm Liquid Limit = n/a mm Plasticity Index = n/amm Sand Equivalent = n/a

mm Fracture %. 1 Face = n/a Coeff. of Curvature, $C_C = 1.11$ Coeff. of Uniformity, $C_U = 3.34$ Fineness Modulus = 0.42

Plastic Limit = n/a Moisture %, as sampled = 57.6% Req'd Sand Equivalent = Rea'd Fracture %, 1 Face =

ASTM C136, ASTM D6913, ASTM C117						
		Actual	Interpolated Cumulative			Grain Size Distribution
Sieve	Cina	Percent	Percent	Cuasa	Cuesa	
US	Metric	Passing	Passing	Specs Max	Specs Min	10 4 4 6 10 10 10 10 10 10 10 10 10 10 10 10 10
2.00"	300.00	1 assing	100%	100.0%	0.0%	
0.00"	250.00		100%	100.0%	0.0%	
8.00"	200.00		100%	100.0%	0.0%	90%
6.00"	150.00		100%	100.0%	0.0%	
4.00"	100.00		100%	100.0%	0.0%	
3.00"	75.00		100%	100.0%	0.0%	80%
2.50"	63.00		100%	100.0%	0.0%	[
2.00"	50.00	100%	100%	100.0%	0.0%	
		10076				70%
1.75"	45.00		100%	100.0%	0.0%	
1.50"	37.50		100%	100.0%	0.0%	60.0%
1.25"	31.50	1000/	100%	100.0%	0.0%	
1.00"	25.00	100%	100%	100.0%	0.0%	0.05 0.4 44 50%
3/4"	19.00	100%	100%	100.0%	0.0%	50 S S S S S S S S S S S S S S S S S S S
5/8"	16.00		100%	100.0%	0.0%	
1/2"	12.50	100%	100%	100.0%	0.0%	
3/8"	9.50	100%	100%	100.0%	0.0%	40%
1/4"	6.30		100%	100.0%	0.0%	<u> </u>
#4	4.75	100%	100%	100.0%	0.0%	30%
#8	2.36		99%	100.0%	0.0%	30%
#10	2.00	99%	99%	100.0%	0.0%	
#16	1.18		99%	100.0%	0.0%	20%
#20	0.850		99%	100.0%	0.0%	
#30	0.600		99%	100.0%	0.0%	
#40	0.425	99%	99%	100.0%	0.0%	10%
#50	0.300		87%	100.0%	0.0%	
#60	0.250		83%	100.0%	0.0%	
#80	0.180		76%	100.0%	0.0%	0% 100.000 10.000 1.000 0.100 0.010 0.001
#100	0.150	73%	73%	100.0%	0.0%	
#140	0.106		50%	100.0%	0.0%	Particle Size (mm)
#170	0.090		41%	100.0%	0.0%	
#200	0.075	33.4%	33.4%	100.0%	0.0%	+ Sieve Sizes — Max Specs — Min Specs — Sieve Results

Comments: Reviewed by:



Hydrometer Report

Project:	Q.C Lower	Duwamish Wat	terway Date Recei	ved: 29-Jul-21		assification Sys	tem, ASTM-2487
Project #:	21B233		Sampled	By: Client	SM, Silty Sand		
Client :	Anchor QEA		Date Tes	sted: 1-Sep-21	Sample Color		
Source:	LDW21-GT1	-GB-10-20 ft	Tested	By: C. Kriss	brown		
Sample#:	B21-1551			·			
ASTM D7928, HYDROMETER ANALYSIS						ASTM	D6913
Sp Gr :	2.53					Sieve A	nalysis
Sample Weight:	75.48	grams				Grain Size I	Distribution
Hydroscopic Moist.:	2.34%			65 Gr	Sieve	Percent	Soils Particle
Adj. Sample Wgt :	73.75	grams		ACCREDITED	Size	Passing	Diameter
		0		Certificate #: 1366.01	3.0"	100%	75.000 mm
Hydrometer					2.0"	100%	50.000 mm
Reading	Corrected	Percent	Soils Particle		1.5"	100%	37.500 mm
Minutes	Reading	Passing	Diameter		1.25"	100%	31.500 mm
1	8	11.1%	0.0554 mm		1.0"	100%	25.000 mm
2	7.5	10.4%	0.0394 mm		3/4"	100%	19.000 mm
5	5.5	7.6%	0.0252 mm		5/8"	100%	16.000 mm
15	4	5.5%	0.0146 mm		1/2"	100%	12.500 mm
30	3	4.2%	0.0104 mm		3/8"	100%	9.500 mm
60	1.5	2.1%	0.0074 mm		1/4"	100%	6.300 mm
240	1.3	1.4%	0.0074 mm		#4	100%	4.750 mm
	1	1.4%			#10	99%	
1440	1	1.4%	0.0015 mm				2.000 mm
0/ 0 1	0.50/				#20	99%	0.850 mm
% Gravel:	0.5%		iquid Limit: n/a		#40	99%	0.425 mm
% Sand:	66.2%		lastic Limit: n/a		#100	73%	0.150 mm
% Silt:	31.8%	Plas	ticity Index: n/a		#200	33.4%	0.075 mm
% Clay:	1.6%				Silts	32.2%	0.074 mm
						12.5%	0.050 mm
						6.6%	0.020 mm
					Clays	1.6%	0.005 mm
						1.4%	0.002 mm
					Colloids	0.9%	0.001 mm
	USDA S	oil Textural C	Classification				
		Particle Size					
% Sand:		2.0 - 0.05 mm					
% Silt:		0.05 - 0.002 mm	ı				
% Clay:		< 0.002 mm					
	USDA S	oil Textural C	Classification				
		Sand					
All			East do not East donnels	-11	64-4-1		
regarding our reports is reserved pend			clients, the public and ourselves,	an reports are submitted as the cor	indential property of clients,	and authorization for publica	tion of statements, conclusions or extracts from or
C							
Comments:							
	1	Belget anillo					
	Manh H	placet andlo					
Reviewed by:	17	0					
	Meghan Blodget	t-Carrillo					

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1551
Sample Date:	7/9/2021
Test Date:	9/23/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT1-GB-10-20 ft

 Visual Soil Description:
 brown silty sand

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

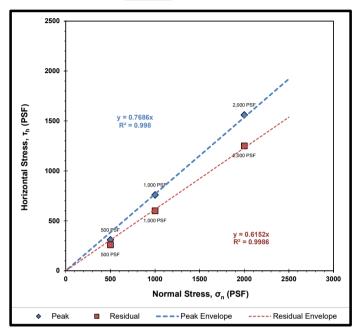
Specimen Height (in): 1
Rate of Strain (in/min): 0.0208
Estimated Specific Gravity of Solids: 2.65

Summary of Sample	e Data:	σ _n =500 PSF
Initial Moisture Content (%):	30.0	
	Initial	Post-Consolidation
Dry Density (PCF):	106.5	108.9
Void Ratio:	0.581	0.547
Porosity (%):	36.8	35.4
Degree of Saturation (%):	saturated	saturated

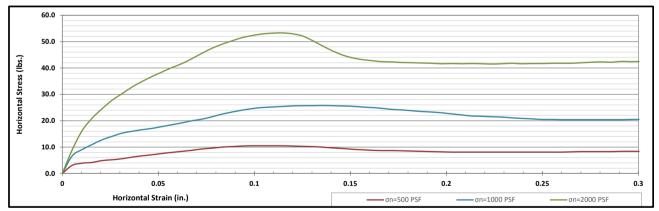
Summary of Sample	Data:	σ _n =1000 PSF
Initial Moisture Content (%):	29.7	
	Initial	Post-Consolidation
Dry Density (PCF):	598.3	612.5
Void Ratio:	-0.718	-0.725
Porosity (%):	-255.1	-263.6
Degree of Saturation (%):	-111.5	saturated

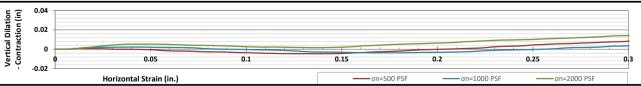
Summary of Samp	σ _n =2000 PSF	
Initial Moisture Content (%):	29.8	
	Initial	Post-Consolidation
Dry Density (PCF):	107.6	113.2
Void Ratio:	0.566	0.488
Porosity (%):	36.1	32.8
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS									
PEAK RESIDUAL									
Angle of Internal Friction, φ (°):	38	32							
Cohesion (PSF):	0	0							



Failure Envelope Test Values:								
Normal Stress, σ _n (PSF):	500	1000	2000					
Peak Horizontal Stress, τ _h (PSF):	310	760	1560					
Residual Horizontal Stress, τ _h (PSF):	260	600	1250					





Corporate • 777 Chrysler Drive • Burlington, WA 98233 • Phone 360.755.1990 • Fax 360.755.1980 SW Region • 2118 Black Lake Blvd. S.W.• Olympia, WA 98512 • Phone 360.534.9777 • Fax 360.534.9779 NW Region • 805 Dupont, Suite #5 • Bellingham, WA 98225 • Phone 360.647.6061 • Fax 360.647.8111 Kitsap Region • 5451 N.W. Newberry Hill Road, Suite 101 • Silverdale, WA 98383 • Phone/Fax 360.698.6787



Client:	Anchor QEA	Date:	October 1, 2021
Address:	21328 2nd Drive SE	Project:	Q.C Lower Duwamish Waterway
	Bothell, WA 98021	Project #:	21B233
Attn:	Garrett Timm	Sample #:	B21-1563-1577
Revised on:		Date sampled:	7-12-21 & 7-13-21

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	Please See Attached Reports		Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count			LA Abrasion	
X	Moisture Content	Please See Attached Report	X	Direct Shear	Please See Attached Reports
	Specific Gravity, Coarse		X	Specific Gravity, Soils	Please See Attached Reports
	Specific Gravity, Fine				
X	Hydrometer Analysis	Please See Attached Reports			
X	Atterberg Limits	Please See Attached Reports			

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted, Meghan Blodgett-Carrillo

WABO Supervising Laboratory Technician



Moisture Content - ASTM C566, ASTM D2216

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: September 3, 2021	Tested by: A. Eifrig

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B21-1563	LDW21-GT13-GB-0-1.5 ft	229.0	1015.9	773.9	242.0	544.9	44.4%
B21-1564	LDW21-GT13-GB-0-11 ft	221.0	537.3	449.8	87.5	228.8	38.2%
B21-1565	LDW21-GT13-GB-11-12.5 ft	217.1	1140.1	930.2	209.9	713.1	29.4%
B21-1566	LDW21-GT13-GB-11-21 ft	233.4	922.3	739.9	182.4	506.5	36.0%
B21-1567	LDW21-GT13-GB-21-22.5 ft	222.0	1231.9	1002.3	229.6	780.3	29.4%
B21-1568	LDW21-GT13-GB-21-31 ft	222.1	758.0	621.0	137.0	398.9	34.3%
B21-1569	LDW21-GT13-GB-31-32.5 ft	208.7	1100.3	893.6	206.7	684.9	30.2%
B21-1570	LDW21-GT19-GB-0-1.5 ft	234.8	863.2	678.6	184.6	443.8	41.6%
B21-1571	LDW21-GT19-GB-0-6.9 ft	222.1	761.3	524.7	236.6	302.6	78.2%
B21-1572	LDW21-GT19-GB-6.9-8.5 ft	233.1	1713.9	1391.1	322.8	1158.0	27.9%
B21-1573	LDW21-GT19-GB-8.5-10 ft	220.2	954.0	779.7	174.3	559.5	31.2%
B21-1574	LDW21-GT19-GB-8.5-18.5 ft	224.3	805.4	688.5	116.9	464.2	25.2%
B21-1575	LDW21-GT19-GB-18.5-20 ft	229.6	1121.9	927.8	194.1	698.2	27.8%
B21-1576	LDW21-GT19-GB-18.5-28.5 ft	215.7	1329.2	1088.0	241.2	872.3	27.7%
B21-1577	LDW21-GT19-GB-28.5-30 ft	225.2	725.0	616.3	108.7	391.1	27.8%
		+					

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:



Moisture Content - ASTM D854

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: September 1, 2021	Tested by: A. Eifrig

Sample # B21-1564	Location LDW21-GT13-GB-0-11 ft	Tare 378.85	Dry Soil + Tare 431.72	Mass of Dry Soil 52.9	Pycno ID TSA-016	Mass of Pycno 197.2	Volume of Pycno 499.5	Density of Water @ Tx 0.99747	Mass of Pycno filled w/ water & soils 728.02	Mass of	Water, 0.1 *C		Factor	Corrected SpG 2.6068253
B21-1568	LDW21-GT13-GB-21-31 ft	394.06	438.75	44.7	TSA-012	180.4	499.5	0.99752	706.18	678.65		2.6041054		2.6023085
B21-1571	LDW21-GT19-GB-0-6.9 ft	429.62	462.35	32.7	TSA-014	192.3	499.5	0.99752	710.77	690.55		2.6160217		2.6142167
B21-1574	LDW21-GT19-GB-8.5-18.5 ft	415.36	464.91	49.6	TSA-013	184.0	499.7	0.99754	712.79	682.43		2.5819681		2.5802382
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All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:

Meghan Blodgett-Carrillo



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT13-GB-0-11 ft Sample#: B21-1564

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 1-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D43} \\ \textbf{D}_{(5)} = 0.008 \\ \textbf{D}_{(10)} = 0.019 \\ \textbf{D}_{(15)} = 0.053 \\ \textbf{D}_{(30)} = 0.121 \\ \textbf{D}_{(50)} = 0.244 \\ \textbf{D}_{(60)} = 0.301 \\ \textbf{D}_{(90)} = 1.175 \\ \textbf{Partice} = 26(87) \end{array}$ mm % Gravel = 0.4% % Sand = 75.2% mm % Silt & Clay = 24.4% mm mm Liquid Limit = 0.0% Plasticity Index = 0.0% mm Sand Equivalent = n/a

mm Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 2.52$ Coeff. of Uniformity, $C_U = 15.71$ Fineness Modulus = 1.34

Plastic Limit = 0.0% Moisture %, as sampled = 38.2% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face =

					Dı	st Ratio = 26/87	Fracture %, $2+$ Faces = n/a	Req'd Fracture %, 2+ Faces =
	ASTM C136, ASTM D6913, ASTM C117							
			Interpolated				Grain Size Distribution	
		Cumulative			ı	1		
Sieve Size		Percent	Percent	Specs	Specs	b in in t	2. 2. 1.2. 1.2. 1.2. 1.2. 1.2. 1.2. 1.2	8458
US	Metric	Passing	Passing	Max	Min	100%	**************************************	** *** T 100.0%
12.00"	300.00		100%	100.0%	0.0%			
10.00"	250.00		100%	100.0%	0.0%	 		
8.00"	200.00		100%	100.0%	0.0%	90%	######################################	90.0%
6.00"	150.00		100%	100.0%	0.0%		N	
4.00"	100.00		100%	100.0%	0.0%	80%		80.0%
3.00"	75.00		100%	100.0%	0.0%	30,8		111111111111111111111111111111111111111
2.50"	63.00		100%	100.0%	0.0%	[]	111111111111111111111111111111111111111	
2.00"	50.00	100%	100%	100.0%	0.0%	70%	##### # ##############################	70.0%
1.75"	45.00		100%	100.0%	0.0%			
1.50"	37.50		100%	100.0%	0.0%			
1.25"	31.50		100%	100.0%	0.0%	60%	######################################	
1.00"	25.00	100%	100%	100.0%	0.0%	<u>e</u>		50.0% ag
3/4"	19.00	100%	100%	100.0%	0.0%	01 180 180 180 180 180 180 180 180 180 1		18
5/8"	16.00		100%	100.0%	0.0%	be 50%	IIII III III III III III III III III I	50.0% №
1/2"	12.50	100%	100%	100.0%	0.0%			
3/8"	9.50	100%	100%	100.0%	0.0%	40%		40.0%
1/4"	6.30		100%	100.0%	0.0%			
#4	4.75	100%	100%	100.0%	0.0%			\
#8	2.36		99%	100.0%	0.0%	30%		30.0%
#10	2.00	99%	99%	100.0%	0.0%	 		X
#16	1.18		90%	100.0%	0.0%			17
#20	0.850		86%	100.0%	0.0%	20%		20.0%
#30	0.600		84%	100.0%	0.0%	I I		
#40	0.425	82%	82%	100.0%	0.0%	10%		10.0%
#50	0.300		60%	100.0%	0.0%			
#60	0.250		51%	100.0%	0.0%			
#80	0.180		39%	100.0%	0.0%	0%		0.100 0.010 0.001
#100	0.150	34%	34%	100.0%	0.0%	100.	10.000	0.000
#140	0.106	-	28%	100.0%	0.0%		Particle Size (mm)	
#170	0.090		26%	100.0%	0.0%			
#200	0.075	24.4%	24.4%	100.0%	0.0%	+ Sieve Sizes	—▲ — Max Specs — ● — Min Sp	ecs Sieve Results
* *		mical Services PS, 1996-98						
				and ourselves, all reports are	submitted as the confide	ntial property of clients, and authorization for	publication of statements, conclusions or extracts from or	regarding our reports is reserved pending our written appro

Meghan Blodgett-Carrillo

Reviewed by: _



Hydrometer Report

Project:	Q.C Lower	Duwamish Wa	terway Date Recei	ved: 29-Jul-21	Unified Soil Cl	assification Sys	stem, ASTM-2487
Project #:	21B233		Sampled	By: Client	SM, Silty Sand		
Client :	Anchor QEA		Date Tes	sted: 1-Sep-21	Sample Color		
Source:	LDW21-GT1	3-GB-0-11 ft	Tested	By: C. Kriss	brown		
Sample#:				•			
		, HYDROMI	ETER ANALYSI	S		ASTM	D6913
Sp Gr :	2.61						analysis
Sample Weight:	100.15	grams					Distribution
Hydroscopic Moist.:	0.83%	C			Sieve	Percent	Soils Particle
Adj. Sample Wgt :	99.33	grams		ACCREDITED	Size	Passing	Diameter
		8		Certificate #: 1366.01	3.0"	100%	75.000 mm
Hydrometer					2.0"	100%	50.000 mm
Reading	Corrected	Percent	Soils Particle		1.5"	100%	37.500 mm
Minutes	Reading	Passing	Diameter		1.25"	100%	31.500 mm
1	14.5	14.6%	0.0519 mm		1.0"	100%	25.000 mm
2	13	13.1%	0.0369 mm		3/4"	100%	19.000 mm
5	11.5	11.6%	0.0236 mm		5/8"	100%	16.000 mm
15	8	8.1%	0.0139 mm		1/2"	100%	12.500 mm
30	6.5	6.6%	0.0099 mm		3/8"	100%	9.500 mm
60	4	4.0%	0.0071 mm		1/4"	100%	6.300 mm
240	1	1.0%	0.0036 mm		#4	100%	4.750 mm
1440	1	1.0%	0.0015 mm		#10	99%	2.000 mm
					#20	86%	0.850 mm
% Gravel:	0.4%	L	iquid Limit: 0.0 %		#40	82%	0.425 mm
% Sand:	75.2%	P	lastic Limit: 0.0 %		#100	34%	0.150 mm
% Silt:	22.2%	Plas	ticity Index: 0.0 %		#200	24.4%	0.075 mm
% Clay:	2.2%				Silts	24.0%	0.074 mm
						14.6%	0.050 mm
						10.3%	0.020 mm
					Clays	2.2%	0.005 mm
						1.0%	0.002 mm
					Colloids	0.7%	0.001 mm
	USDA S	oil Textural (Classification				
		Particle Size					
% Sand:		2.0 - 0.05 mm					
% Silt:		0.05 - 0.002 mm	1				
% Clay:		< 0.002 mm					
·							
	USDA S	oil Textural (Classification				
		Loamy Sand					
All results apply only to actual location regarding our reports is reserved pend			clients, the public and ourselves,	all reports are submitted as the con	fidential property of clients,	and authorization for public	ation of statements, conclusions or extracts from or
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Reviewed by:	0	\mathcal{C}					
· ·	Meghan Blodgett	-Carrillo	·				

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1564
Sample Date:	7/12/2021
Test Date:	9/20/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT13-GB-0-11 ft

 Visual Soil Description:
 brown sand with silt

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

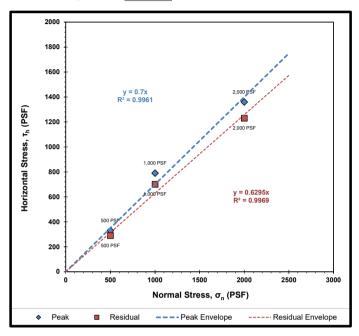
Specimen Height (in): 1
Rate of Strain (in/min): 0.0208
Estimated Specific Gravity of Solids: 2.65

Summary of Samp	le Data:	σ _n =500 PSF
Initial Moisture Content (%):	32.6	
	Initial	Post-Consolidation
Dry Density (PCF):	104.7	106.1
Void Ratio:	0.608	0.589
Porosity (%):	37.8	37.0
Degree of Saturation (%):	saturated	saturated

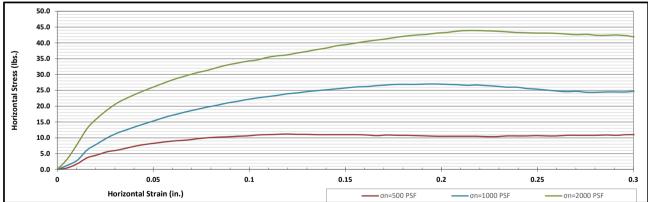
Summary of Sampl	e Data:	σ _n =1000 PSF
Initial Moisture Content (%):	30.5	
	Initial	Post-Consolidation
Dry Density (PCF):	105.5	108.0
Void Ratio:	0.597	0.560
Porosity (%):	37.4	35.9
Degree of Saturation (%):	saturated	saturated

Summary of Sample	Data:	σ _n =2000 PSF
Initial Moisture Content (%):	31.4	
	Initial	Post-Consolidation
Dry Density (PCF):	105.7	113.8
Void Ratio:	0.595	0.481
Porosity (%):	37.3	32.5
Degree of Saturation (%):	saturated	saturated

ESTIMATED STR	ENGTH PARA	METERS
	PEAK	RESIDUAL
Angle of Internal Friction, φ (°):	35	32
Cohesion (PSF):	0	0



Failure Envelope Test	Values:		
Normal Stress, σ _n (PSF):	500	1000	2000
Peak Horizontal Stress, τ _h (PSF):	330	790	1360
Residual Horizontal Stress, τ _h (PSF):	290	700	1230





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT13-GB-11-21 ft

Sample#: B21-1566

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 1-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

brown

ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{c} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.020 \\ \textbf{D}_{(10)} = 0.040 \\ \textbf{D}_{(15)} = 0.060 \\ \textbf{D}_{(30)} = 0.107 \\ \textbf{D}_{(50)} = 0.177 \\ \textbf{D}_{(60)} = 0.230 \\ \textbf{D}_{(90)} = 0.388 \\ \textbf{Patic} = 17/88 \end{array}$ mm % Gravel = 0.3% % Sand = 81.0% mm % Silt & Clay = 18.7% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a

mm Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 1.25$ Coeff. of Uniformity, $C_U = 5.74$ Fineness Modulus = 0.87

Plastic Limit = n/a Moisture %, as sampled = 36.0% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

					Dı	ust Ratio = 17/88	Fracture %, 2+ Faces = n/a	Req'd Fracture %, 2+ Faces =
				AS	TM C136, AST	TM D6913, ASTM C117		
		Actual	Interpolated				Grain Size Distribution	
CI.	CI.	1	Cumulative			4	4 .	
	Size	Percent	Percent	Specs	Specs	.6 J.G.	9 4. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17	88658
US	Metric	Passing	Passing	Max	Min	100%	*-*:**********************************	100.0%
12.00"	300.00		100%	100.0%	0.0%	-		
10.00"	250.00		100%	100.0%	0.0%	90%		90.0%
8.00"	200.00		100%	100.0%	0.0%	90%		70.0%
6.00"	150.00		100%	100.0%	0.0%		\	
4.00"	100.00		100%	100.0%	0.0%	80%		80.0%
3.00"	75.00		100%	100.0%	0.0%			
2.50"	63.00		100%	100.0%	0.0%			
2.00"	50.00	100%	100%	100.0%	0.0%	70%		70.0%
1.75"	45.00		100%	100.0%	0.0%		\	
1.50"	37.50		100%	100.0%	0.0%			ii
1.25"	31.50		100%	100.0%	0.0%	60%		60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	D Lie		Buig
3/4"	19.00	100%	100%	100.0%	0.0%	Di Li 1880 88 50%		50.0% of the state
5/8"	16.00		100%	100.0%	0.0%	Bc		\
1/2"	12.50	100%	100%	100.0%	0.0%			
3/8"	9.50	100%	100%	100.0%	0.0%	40%		40.0%
1/4"	6.30		100%	100.0%	0.0%			
#4	4.75	100%	100%	100.0%	0.0%			
#8	2.36		99%	100.0%	0.0%	30%		30.0%
#10	2.00	99%	99%	100.0%	0.0%			<u> </u>
#16	1.18		98%	100.0%	0.0%	20%		20.0%
#20	0.850		98%	100.0%	0.0%	20%		1 1 20.0%
#30	0.600		97%	100.0%	0.0%			
#40	0.425	97%	97%	100.0%	0.0%	10%		10.0%
#50	0.300		73%	100.0%	0.0%			
#60	0.250		64%	100.0%	0.0%			
#80	0.180		51%	100.0%	0.0%	0%	0 - 6 10 4 10 4 10 4 10 4 10 4 10 4 10 4 10	0.100 0.010 0.001
#100	0.150	45%	45%	100.0%	0.0%			
#140	0.106		30%	100.0%	0.0%		Particle Size (mm)	
#170	0.090		24%	100.0%	0.0%			
#200	0.075	18.7%	18.7%	100.0%	0.0%	+ Sieve Sizes	—▲ — Max Specs — Min	Specs Sieve Results
	t Spears Engineering & Tec	l	Į.					
							n for publication of statements, conclusions or extracts from	F 2.1 1 F 34

Reviewed by: Meghan Blodgett-Carrillo



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT13-GB-21-31 ft Sample#: B21-1568

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 1-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{l} \textbf{ASIM D43} \\ \textbf{D}_{(5)} = 0.021 \\ \textbf{D}_{(10)} = 0.042 \\ \textbf{D}_{(15)} = 0.063 \\ \textbf{D}_{(30)} = 0.109 \\ \textbf{D}_{(50)} = 0.177 \\ \textbf{D}_{(60)} = 0.229 \\ \textbf{D}_{(90)} = 0.385 \end{array}$ mm % Gravel = 0.1% % Sand = 82.1% mm % Silt & Clay = 17.9% mm mm Liquid Limit = n/a mm Plasticity Index = n/amm Sand Equivalent = n/a Fracture %, 1 Face = n/a mm

Coeff. of Curvature, $C_C = 1.23$ Coeff. of Uniformity, $C_U = 5.46$ Fineness Modulus = 0.85 Plastic Limit = n/a

Moisture %, as sampled = 34.3% Req'd Sand Equivalent =
Req'd Fracture %, 1 Face =

					D	$D_{(90)} = 0.385$ Just Ratio = 13/71	mm	1	Fracture 9						i'd Frac Fractu			
				AS		TM D6913, ASTM	C117		Tracture	70, 2 1 1	iccs – i	11/ a		recqu	Tractu	10 70, 2	. racc	3 —
		Actual	Interpolated	1.20	71.11 (2100) 115	V	0117		Grain S	ize Distribu	rtion							
		Cumulative	Cumulative						- Grains	ize Distribu	IIIOII							
Sieve		Percent	Percent	Specs	Specs		ъ.	. φ. 4+ φ.		8 :4 4	2 2 2	8 2 8	3888	38				
US	Metric	Passing	Passing	Max	Min	10	00%			ਰ ≥ ≑ decedit	**	# # # 	# # # # # # # # # # # # # # # # # # #			штт	г т т	100.0%
12.00"	300.00		100%	100.0%	0.0%							***						
10.00"	250.00		100%	100.0%	0.0%							1						
8.00"	200.00		100%	100.0%	0.0%		70%			-							<u> </u>	90.0%
6.00"	150.00		100%	100.0%	0.0%		ł					1					1 1	
4.00"	100.00		100%	100.0%	0.0%		80%					1					<u> </u>	80.0%
3.00"	75.00		100%	100.0%	0.0%	1	10% F											60.0%
2.50"	63.00		100%	100.0%	0.0%													
2.00"	50.00	100%	100%	100.0%	0.0%		70% I				4			Ш.				70.0%
1.75"	45.00		100%	100.0%	0.0%								1				1	
1.50"	37.50		100%	100.0%	0.0%								ì				1	
1.25"	31.50		100%	100.0%	0.0%		50%			+++++			1	╫╫┼			 	60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	<u>0</u>	ŀ						1					50.0%
3/4"	19.00	100%	100%	100.0%	0.0%	% Possing							İ					50.00
5/8"	16.00		100%	100.0%	0.0%	96	50%						ľ					50.0% _{be}
1/2"	12.50	100%	100%	100.0%	0.0%								1					
3/8"	9.50	100%	100%	100.0%	0.0%		10%							Ш.			1	40.0%
1/4"	6.30		100%	100.0%	0.0%								1					
#4	4.75	100%	100%	100.0%	0.0%								١ ١					
#8	2.36		100%	100.0%	0.0%	;	30%				+						 	30.0%
#10	2.00	100%	100%	100.0%	0.0%		-											
#16	1.18		99%	100.0%	0.0%	1												
#20	0.850		98%	100.0%	0.0%	1	20%							*				20.0%
#30	0.600		98%	100.0%	0.0%												1	
#40	0.425	98%	98%	100.0%	0.0%		10%							ШШ.				10.0%
#50	0.300		74%	100.0%	0.0%		ŀ											
#60	0.250		64%	100.0%	0.0%													
#80	0.180		51%	100.0%	0.0%		0%	100.000	10.	MAPT T	1.000	-	0.1		0.0	10	0.0	0.0%
#100	0.150	45%	45%	100.0%	0.0%			100.000	10.		1.000		0.1	00	0.0	10	0.0	,,
#140	0.106	.570	29%	100.0%	0.0%					Particle Siz	e (mm)							
#170	0.090		23%	100.0%	0.0%													
#200	0.075	17.9%	17.9%	100.0%	0.0%	+ Sie	ve Sizes		Max	Specs	_	• — N	tin Specs			Sieve Re:	sults	
	Spears Engineering & Tec	ļ	ļ		2.070													
				and ourselves, all reports are	submitted as the confide	ential property of clients, and a	uthorizat	ion for publ	ication of staten	nents, concl	isions or ex	tracts fr	om or rega	rding our	reports is re	eserved po	nding our	written app

Reviewed by: _



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT19-GB-0-6.9 ft

Sample#: B21-1571

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 1-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

ML, Silt with Sand Sample Color:

mm

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{l} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.004 \\ \textbf{D}_{(10)} = 0.007 \\ \textbf{D}_{(15)} = 0.009 \\ \textbf{D}_{(30)} = 0.019 \\ \textbf{D}_{(50)} = 0.051 \\ \textbf{D}_{(60)} = 0.062 \\ \textbf{D}_{(90)} = 0.186 \\ \textbf{Partice} = 59/79 \\ \end{array}$ mm % Gravel = 1.2% % Sand = 27.1% mm % Silt & Clay = 71.7% mm mm Liquid Limit = 0.0% Plasticity Index = 0.0% mm Sand Equivalent = n/a

Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 0.88$ Coeff. of Uniformity, $C_U = 9.46$ Fineness Modulus = 0.29

Plastic Limit = 0.0% Moisture %, as sampled = 78.2% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face =

				AS		st Ratio = 59/79 M D6913, ASTM	C117		Fra	cture 9	6, 2+1	aces	= n/a		R	eq'd I	ractui	e %, 2	2+ Fac	ces =
		Actual	Interpolated	AS	1 WI C130, AS1	WI D0913, AST WI	CIII			Grain Si	ze Distrik	oution								
		Cumulative	Cumulative							Giulii si	ZE DISTIIL	JUHUTT								
Sieve	Size	Percent	Percent	Specs	Specs		b.	6 4 W			8 - 4	_m o	° 2 2	\$ 8 8 8 8	8988					
US	Metric	Passing	Passing	Max	Min		∞ ≃ ••• 3000		• (• •	- 13 6	5 × 1	##	= = =	¥ ¥ ¥ ¥	***				,	··· - 100.0%
12.00"	300.00		100%	100.0%	0.0%															1
10.00"	250.00		100%	100.0%	0.0%									N.						1
8.00"	200.00		100%	100.0%	0.0%		90%								•	+++	+	+++	-	90.0%
6.00"	150.00		100%	100.0%	0.0%										1					1
4.00"	100.00		100%	100.0%	0.0%										1111					1
3.00"	75.00		100%	100.0%	0.0%		80%							TTT	1	Ш		mm		80.0%
2.50"	63.00		100%	100.0%	0.0%										À					1
2.00"	50.00	100%	100%	100.0%	0.0%		70%					ļ		444		Ш				70.0%
1.75"	45.00		100%	100.0%	0.0%		l l								111					1
1.50"	37.50		100%	100.0%	0.0%		Ł									(1
1.25"	31.50		100%	100.0%	0.0%		60%	-+	++++	-				+++		₩	-	+++	-	60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	p	F									*				} :
3/4"	19.00	100%	100%	100.0%	0.0%	% Possing	[IN				50.0%
5/8"	16.00		100%	100.0%	0.0%	96	50%							m		Ш		mm		50.0%
1/2"	12.50	100%	100%	100.0%	0.0%											$\ \cdot\ _{\mathbb{N}}$				1
3/8"	9.50	100%	100%	100.0%	0.0%		40%		Ш.	_	Ш.	ļļ		444		\coprod		Ш.	ļļ	40.0%
1/4"	6.30		99%	100.0%	0.0%												\l l			1
#4	4.75	99%	99%	100.0%	0.0%												7			1
#8	2.36		98%	100.0%	0.0%		30%		++++					+++	-	Ш	\uparrow	+++		30.0%
#10	2.00	98%	98%	100.0%	0.0%		ŀ										$\parallel \setminus \parallel$			1
#16	1.18		97%	100.0%	0.0%												$ \cdot $			1
#20	0.850		96%	100.0%	0.0%		20%										/			20.0%
#30	0.600		96%	100.0%	0.0%													VIII		1
#40	0.425	96%	96%	100.0%	0.0%		10%				 			+ + +		Ш		\mathbb{A}		10.0%
#50	0.300		93%	100.0%	0.0%													*		1
#60	0.250		92%	100.0%	0.0%														*	1
#80	0.180		90%	100.0%	0.0%		0%	100.000		10.0	00		.000	0-00-0	0.100		0.01	0	1 1	0.0%
#100	0.150	89%	89%	100.0%	0.0%			100.000	-	10.0	~~		.000		0.100		0.01			
#140	0.106		79%	100.0%	0.0%						Particle S	ize (mm)								
#170	0.090		75%	100.0%	0.0%															
#200	0.075	71.7%	71.7%	100.0%	0.0%	+ s	ieve Sizes			— Мах	Specs		 -	– Min Sp	ecs	_		Sieve Re	esults	
Copyright	Spears Engineering & Tec	hnical Services PS, 1996-98																		

Reviewed by: _



Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Unified Soil Classification System, ASTM-2487 **Project #:** 21B233 ML, Silt with Sand Sampled By: Client Client: Anchor QEA Date Tested: 1-Sep-21 Sample Color Source: LDW21-GT19-GB-0-6.9 ft Tested By: C. Kriss brown Sample#: B21-1571 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Sp Gr: Sieve Analysis 2.61 Sample Weight: 50.97 **Grain Size Distribution** Hydroscopic Moist .: 2.35% Soils Particle Sieve Percent ACCREDITED Adj. Sample Wgt: 49.80 Size Passing Diameter 3.0" 100% 75.000 mm 2.0" 100% 50.000 mm Hydrometer Soils Particle 1.5" Reading Percent 100% 37.500 mm Corrected Minutes 1.25" 100% 31.500 mm Reading Passing Diameter 25.000 mm 0.0488 mm 24.5 48.4% 1.0" 100% 19.5 38.6% $0.0356 \ mm$ 3/4" 100% 19.000 mm 17.5 34.6% 0.0228 mm 5/8" 100% 16.000 mm 23.7% 0.0135 mm 1/2" 100% 12.500 mm 30 17.8% 0.0097 mm 3/8" 100% 9.500 mm 0.0070 mm 60 5.5 10.9% 1/4" 99% 6.300 mm 240 4.9% 0.0036 mm 99% 4.750 mm 2.5 #4 2.0% 0.0015 mm #10 98% 2.000 mm 1440 0.850 mm #20 96% 1.2% Liquid Limit: 0.0 % % Gravel: #40 96% 0.425 mm % Sand: 27.1% Plastic Limit: 0.0 % #100 89% 0.150 mm % Silt: 64.3% Plasticity Index: 0.0 % #200 71.7% 0.075 mm 0.074 mm % Clay: 7.4% Silts 70.8% 56.9% 0.050 mm 0.020 mm 31.3% 7.4% 0.005 mm Clays 2.7% $0.002 \ mm$ Colloids 1.3% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: 2.0 - 0.05 mm 0.05 - 0.002 mm % Silt: < 0.002 mm % Clay: **USDA Soil Textural Classification** All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval. **Comments:** Reviewed by:



ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C. - Lower Duwamish Waterway Unified Soils Classification System, ASTM D-2487 Date Received: 29-Jul-21 Sampled By: Client MI. Silt with Sand **Project #:** 21B233 Client: Anchor QEA Date Tested: 1-Sep-21 Sample Color Source: LDW21-GT19-GB-0-6.9 ft Tested By: C. Kriss Sample #: B21-1571 **Liquid Limit Determination** Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Liquid limit cannot be established Weight of Pan: Liquid Limit @ 25 Blows: Weight of Dry Soils: Plastic Limit: Plasticity Index, I_P: Weight of Moisture: % Moisture: N/A N/A Number of Blows: Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Plastic limit cannot be determined Weight of Pan: Weight of Dry Soils: Weight of Moisture: % Moisture: **Plasticity Chart Liquid Limit** 80.0 % 100% 70.0 % 90% 60.0 % A" Line Plasticity Index 50.0 % 60% 40.0 % 50% 30.0 % CL or OL MH or OH 20% 10.0 % ML or OL 10% 100% 10 100 **Liquid Limit** Copyright Spears Engineering & Technical Services PS, 1996-98

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our

Comments: Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the liquid limit cup without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT19-GB-6.9-8.5 ft

Sample#: B21-1572

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 1-Sep-21

Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SP-SM, Poorly graded Sand with Silt

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Casasa

No Specs

Sample Meets Specs? N/A

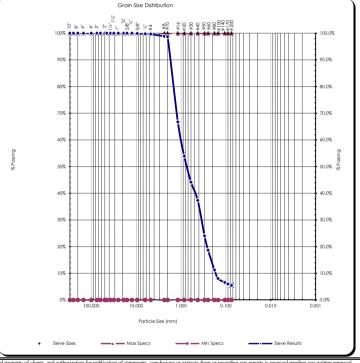
 $\begin{array}{l} \textbf{ASIM D43} \\ \textbf{D}_{(5)} = 0.068 \\ \textbf{D}_{(10)} = 0.168 \\ \textbf{D}_{(15)} = 0.215 \\ \textbf{D}_{(30)} = 0.356 \\ \textbf{D}_{(50)} = 0.749 \\ \textbf{D}_{(60)} = 1.006 \\ \textbf{D}_{(90)} = 1.777 \\ \textbf{Partice} = 9/61 \\ \end{array}$ mm % Gravel = 0.3% % Sand = 94.2% mm % Silt & Clay = 5.5% mm mm Liquid Limit = n/a mm Plasticity Index = n/a mm Sand Equivalent = n/a

mm Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 0.75$ Coeff. of Uniformity, $C_U = 5.98$ Fineness Modulus = 2.59

Plastic Limit = n/a Moisture %, as sampled = 27.9% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

	Du	st Ratio =	9/61	Fracture %, 2+ Faces =	n/a R	teq'd Fracture %, 2+ Faces =	
ľ	ГМ C136, AST	M D6913,	ASTM C11	7			
				Grain Size Distribution			
I	Specs		.0	8" 6" 72" 72" 72" 72" 72" 72" 72" 72" 72" 72	8 8 8 8 8 8 8 8 8 8 8		
	Min		100% 🐽		# # # ## ## ###	▼ 100.0%	å
I	0.0%		t				

				AS	TM C136, AS
		Actual	Interpolated		
		Cumulative	Cumulative		
Sieve	Size	Percent	Percent	Specs	Specs
US	Metric	Passing	Passing	Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		99%	100.0%	0.0%
#10	2.00	99%	99%	100.0%	0.0%
#16	1.18		67%	100.0%	0.0%
#20	0.850		54%	100.0%	0.0%
#30	0.600		44%	100.0%	0.0%
#40	0.425	37%	37%	100.0%	0.0%
#50	0.300		24%	100.0%	0.0%
#60	0.250		19%	100.0%	0.0%
#80	0.180		11%	100.0%	0.0%
#100	0.150	8%	8%	100.0%	0.0%
#140	0.106		7%	100.0%	0.0%
#170	0.090		6%	100.0%	0.0%
#200	0.075	5.5%	5.5%	100.0%	0.0%
Copyrigh	t Spears Engineering & Tech	nical Services PS, 1996-	98		
All regults apply only to	actual locations and materials	tacted Ac a mutual pro	taction to cliente the public o	and ourselves, all reports are	ubmitted as the confide



Meghan Blodgett-Carrillo

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT19-GB-8.5-18.5 ft

Sample#: B21-1574

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 1-Sep-21

Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SP, Poorly graded Sand

mm

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Space

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.103 \\ \textbf{D}_{(10)} = 0.155 \\ \textbf{D}_{(15)} = 0.177 \\ \textbf{D}_{(30)} = 0.242 \\ \textbf{D}_{(50)} = 0.328 \\ \textbf{D}_{(60)} = 0.372 \\ \textbf{D}_{(90)} = 1.435 \\ \textbf{Partice} = 2/53 \end{array}$ mm % Gravel = 0.0% % Sand = 97.3% mm % Silt & Clay = 2.7% mm mm Liquid Limit = n/a Plasticity Index = n/amm

Sand Equivalent = n/a Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 1.01$ Coeff. of Uniformity, $C_U = 2.40$ Fineness Modulus = 1.87

Plastic Limit = n/a Moisture %, as sampled = 25.2% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

					Di	ust Ratio =	2/53	Frac	ture %, 2+1	Faces = 1	ı/a	R	eq'd Fı	racture '	%, 2+	Faces =
				AS	TM C136, AST	ΓM D6913, A	STM C117									
			Interpolated						Grain Size Distrit	oution						
			Cumulative			1										
Sieve		Percent	Percent	Specs	Specs		b in	7 2 3 4 6 7 2 3 4 6	\$6_ \$0 :* 4	∞2 28	8 8 8 8	8258				
US	Metric	Passing	Passing	Max	Min	1	100%		**************************************	TA T T	+++	*****	птт	ттт	пт	T 100.0%
12.00"	300.00		100%	100.0%	0.0%		[]			N						- 1
10.00"	250.00		100%	100.0%	0.0%		11									- 1
8.00"	200.00		100%	100.0%	0.0%		90%			+++++	###	1		 		90.0%
6.00"	150.00		100%	100.0%	0.0%		<u> </u>			1 1						1
4.00"	100.00		100%	100.0%	0.0%		80%									80.0%
3.00"	75.00		100%	100.0%	0.0%		80%			1						00.0%
2.50"	63.00		100%	100.0%	0.0%		F 1				N					1
2.00"	50.00	100%	100%	100.0%	0.0%		70%			 	₩ i +	4	Ш.	Щ.		70.0%
1.75"	45.00		100%	100.0%	0.0%		11									- 1
1.50"	37.50		100%	100.0%	0.0%											1
1.25"	31.50		100%	100.0%	0.0%		60%				-	+				60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	2	<u> </u>									guing
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing										1
5/8"	16.00		100%	100.0%	0.0%	96	50%									50.0%
1/2"	12.50	100%	100%	100.0%	0.0%		11				!					- 1
3/8"	9.50	100%	100%	100.0%	0.0%		40%			 	11111	4				40.0%
1/4"	6.30		100%	100.0%	0.0%		11									1
#4	4.75	100%	100%	100.0%	0.0%		1									1
#8	2.36		100%	100.0%	0.0%		30%				ШH					30.0%
#10	2.00	100%	100%	100.0%	0.0%		[]									1
#16	1.18		86%	100.0%	0.0%							1				1
#20	0.850		80%	100.0%	0.0%		20%					1				20.0%
#30	0.600		75%	100.0%	0.0%							i				1
#40	0.425	72%	72%	100.0%	0.0%		10%					11 111		+-+++		10.0%
#50	0.300		43%	100.0%	0.0%											1
#60	0.250		32%	100.0%	0.0%		11									1
#80	0.180		16%	100.0%	0.0%		0%	100.000	10,000	1,000	10 0 0 0	0.100		0.010		0.0%
#100	0.150	9%	9%	100.0%	0.0%			100.000	10.000	1.000		0.100		0.010		0.001
#140	0.106	*	5%	100.0%	0.0%				Particle S	iize (mm)						
#170	0.090		4%	100.0%	0.0%											
#200	0.075	2.7%	2.7%	100.0%	0.0%		Sieve Sizes		- Max Specs	_	Min	Specs	_	Sie	ve Results	
		hnical Services PS, 1996-9														
			ction to clients, the public													

	O U	
	North Bakget anillo	
Reviewed by:		
-	Maghan Pladgett Carrilla	

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1574
Sample Date:	7/13/2021
Test Date:	9/21/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT19-GB-8.5-18.5 ft

 Visual Soil Description:
 brown sand with silt

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

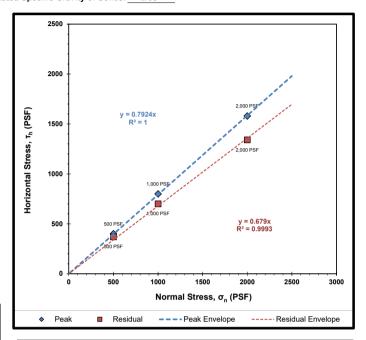
Specimen Height (in): 1
Rate of Strain (in/min): 0.0208
Estimated Specific Gravity of Solids: 2.65

Summary of Samp	le Data:	σ _n =500 PSF
Initial Moisture Content (%):	27.5	
	Initial	Post-Consolidation
Dry Density (PCF):	106.2	107.3
Void Ratio:	0.586	0.570
Porosity (%):	37.0	36.3
Degree of Saturation (%):	saturated	saturated

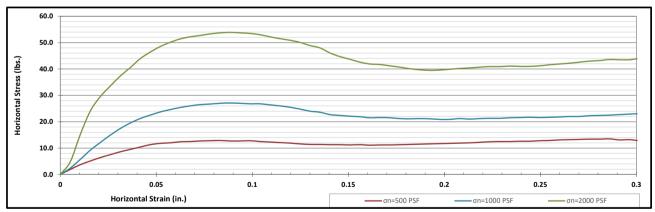
Summary of Sample	Data:	σ _n =1000 PSF
Initial Moisture Content (%):	26.1	
	Initial	Post-Consolidation
Dry Density (PCF):	108.0	109.7
Void Ratio:	0.560	0.536
Porosity (%):	35.9	34.9
Degree of Saturation (%):	saturated	saturated

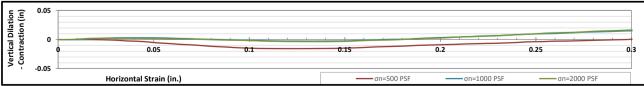
Summary of Sample	e Data:	σ _n =2000 PSF
Initial Moisture Content (%):	24.7	
	Initial	Post-Consolidation
Dry Density (PCF):	109.2	111.5
Void Ratio:	0.543	0.511
Porosity (%):	35.2	33.8
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS								
	PEAK	RESIDUAL						
Angle of Internal Friction, φ (°):	38	34						
Cohesion (PSF):	0	0						



Failure Envelope Test Values:									
Normal Stress, σ _n (PSF):	500	1000	2000						
Peak Horizontal Stress, τ _h (PSF):	400	800	1580						
Residual Horizontal Stress, τ _h (PSF):	370	700	1340						





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT19-GB-18.5-28.5 ft

Sample#: B21-1576

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 1-Sep-21

Tested By: C. Kriss

SP-SM, Poorly graded Sand with Silt

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{l} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.058 \\ \textbf{D}_{(10)} = 0.092 \\ \textbf{D}_{(15)} = 0.117 \\ \textbf{D}_{(30)} = 0.185 \\ \textbf{D}_{(50)} = 0.271 \\ \textbf{D}_{(60)} = 0.314 \\ \textbf{D}_{(90)} = 0.882 \\ \textbf{Partice} = 5/67. \end{array}$ mm % Gravel = 0.0% % Sand = 93.6% mm % Silt & Clay = 6.4% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a

Unified Soil Classification System, ASTM-2487

mm Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 1.18$ Coeff. of Uniformity, $C_U = 3.40$ Fineness Modulus = 1.41

Plastic Limit = n/a Moisture %, as sampled = 27.7% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

Name Company						Dı	ust Ratio =	5/67		Fracture	e %, 2+1	Faces =	n/a		Req'd	Fractu	e %, 2	+ Faces	s =
Sieve Size Percent Percent Passing 10.00° 10.00% 10.					AS	TM C136, AST	ΓM D6913, A	STM C11	7										
Sieve Size Percent P										Grain	n Size Distrik	oution							
US Metric Passing Passing 100% 100			Cumulative	Cumulative						- Ordin	1 SIZE DISTIL	JOHOTT							
12.00" 300.00 100% 100.0% 0	Sieve	Size	Percent	Percent	Specs	Specs		is		2 %		ec 20	2225	88888	28				
10.00" 250.00 100% 100.0% 0			Passing					100% 🔩	****	••••••	%	### ## ## ## ## ## ## ## ## ## ## ## ##	# # # # #	* * * * * *			аттт	т	100.0%
8.00" 200.00 100% 100.0% 0.0%								1				\							
150.00	10.00"	250.00		100%	100.0%	0.0%		t				\							
4.00" 100.00 100% 100% 0.0%	8.00"	200.00		100%	100.0%			90%	1 1									+	90.0%
3.00" 75.00 100% 100.0% 100.0% 0.0% 0.0% 10	6.00"	150.00		100%	100.0%	0.0%		ŀ										1 1	
3.00" 75.00	4.00"	100.00		100%	100.0%	0.0%							1					1 1	00.00
2.00" 50.00 100% 100% 100.0% 0.0% 10		75.00		100%	100.0%	0.0%		00% T										T	00.0%
1.75"	2.50"	63.00		100%	100.0%	0.0%													
1.50" 37.50	2.00"	50.00	100%	100%	100.0%	0.0%		70%	4			-							70.0%
1.25" 31.50	1.75"	45.00		100%	100.0%	0.0%		1											
1.03	1.50"	37.50		100%	100.0%	0.0%		1											
1/2" 12.50 100% 100.0% 0.0%	1.25"	31.50		100%	100.0%	0.0%		60%	+-+	+++++								1 1	
1/2" 12.50 100% 100.0% 0.0%	1.00"	25.00	100%	100%	100.0%	0.0%	0	ŀ						i				1 1	B
1/2" 12.50 100% 100.0% 0.0%		19.00	100%	100%	100.0%	0.0%	8	5007										<u>_</u>	50.00
3/8" 9.50 100% 100% 100.0% 0.0% 100.0	5/8"	16.00		100%	100.0%	0.0%	96	30% T										T	30.0% 88
1/4" 6.30	1/2"	12.50	100%	100%	100.0%	0.0%		F						1				1 1	
#4	3/8"	9.50	100%	100%	100.0%	0.0%		40%						4					40.0%
#8	1/4"	6.30		100%	100.0%	0.0%								\				- 1 - 1	
#10 2.00 100% 100% 0.0% 0.0% #16 1.18 93% 100.0% 0.0% #20 0.850 90% 100.0% 0.0% #30 0.600 87% 100.0% 0.0% #40 0.425 86% 86% 100.0% 0.0% #50 0.300 57% 100.0% 0.0% #60 0.250 45% 100.0% 0.0% #80 0.180 29% 100.0% 0.0% #100 0.150 22% 22% 100.0% 0.0% #110 0.150 13% 100.0% 0.0% #110 0.106 13% 100.0% 0.0% #1170 0.090 10% 100% 0.0%	#4	4.75	100%	100%	100.0%	0.0%								 					
#16	#8	2.36		100%	100.0%	0.0%		30%	1 1										30.0%
#20	#10	2.00	100%	100%	100.0%	0.0%		ŀ										1 1	
#20 0.850 90% 100.0% 0.0% #30 0.600 87% 100.0% 0.0% #40 0.425 86% 86% 100.0% 0.0% #50 0.300 57% 100.0% 0.0% #60 0.250 45% 100.0% 0.0% #80 0.180 29% 100.0% 0.0% #100 0.150 22% 22% 100.0% 0.0% #1440 0.106 133% 100.0% 0.0% #1440 0.106 133% 100.0% 0.0% #170 0.090 10% 100% 0.0%	#16	1.18		93%	100.0%	0.0%		2007											20.0%
#40	#20	0.850		90%	100.0%	0.0%		20,0						\ \				1 1	20.0/6
#50 0.300 57% 100.0% 0.0% 100.0% 0.0% #80 0.180 29% 100.0% 0.0% 100.0% 0.0% 100.00 0.150 22% 22% 100.0% 0.0% 13% 100.0% 0.0% 133% 100.0% 0.0% 137% 100.0% 0.0% 113% 100.0% 0.0% 100.00 0.0	#30	0.600		87%	100.0%	0.0%		F						\ \				1 1	
#60 0.250 45% 100.0% 0.0%	#40	0.425	86%	86%	100.0%	0.0%		10%		++++-							####		10.0%
#80 0.180 29% 100.0% 0.0% 100.000 100.000 1.000 0.100 0.010 0.001 1.000 100.000 1.000 0.100 0.010 0.001 0.001 1.000 1.000 0.100 0.010 0.001 0.00	#50	0.300		57%	100.0%	0.0%		1							>				
#80 0.180 29% 100.0% 0.0% 100.000 10.000 10.000 0.100 0.001 1.000 0.100 0.001 1.000 0.100 0.001 1.000 0.100 0.001 1.000 0.100 0.001 1.000 0.100 0.001 1.000 0.100 0.001 1.000	#60	0.250		45%	100.0%	0.0%		1											
#100 0.150 22% 22% 100.0% 0.0% #140 0.106 13% 100.0% 0.0% #170 0.090 10% 100.0% 0.0%	#80	0.180		29%	100.0%	0.0%		0%	100,000		10.000	1 00 1 01	84646 -4 00	00-00-0 0)) ()	0.01	0		
#140 0.106 13% 100.0% 0.0% Particle Size (mm) #170 0.090 10% 100.0% 0.0%	#100	0.150	22%	22%	100.0%	0.0%						1.0	-	5.10		5.01		2.00	
	#140			13%	100.0%	0.0%					Particle S	ize (mm)							
l l l l l l l l l l l l l l l l l l l	#170	0.090		10%	100.0%	0.0%													
#200 0.075 6.4% 6.4% 100.0% 0.0% + Sieve Sizes - Max Specs - Min Specs - Sieve Results	#200	0.075	6.4%	6.4%	100.0%	0.0%	-	Sieve Size	s	^_ N	tax Specs	_	N	nin Specs			Sieve Resi	ults	
Copyright Spears Engineering & Technical Services PS, 1996-98	Copyright	Spears Engineering & Tec	hnical Services PS, 1996-9	3															

Reviewed by:



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As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	Please See Attached Reports		Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count			LA Abrasion	
X	Moisture Content	Please See Attached Report	X	Direct Shear	Please See Attached Reports
	Specific Gravity, Coarse		X	Specific Gravity, Soils	Please See Attached Reports
	Specific Gravity, Fine				
X	Hydrometer Analysis	Please See Attached Reports			
X	Atterberg Limits	Please See Attached Reports			

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted, Meghan Blodgett-Carrillo

WABO Supervising Laboratory Technician



Moisture Content - ASTM C566, ASTM D2216

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: September 13, 2021	Tested by: A. Eifrig

Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
LDW21-GT37-GB-0-1.5 ft	233.7	583.3	440.8	142.5	207.1	68.8%
LDW21-GT37-GB-10-11.5 ft	302.0	688.9	534.6	154.3	232.6	66.3%
LDW21-GT37-GB-10-20 ft	234.3	678.9	534.1	144.8	299.8	48.3%
LDW21-GT37-GB-20-21.5 ft	341.8	864.9	644.8	220.1	303.0	72.6%
LDW21-GT37-GB-20-30 ft	316.0	945.0	766.3	178.7	450.3	39.7%
LDW21-GT37-GB-30-31.5 ft	346.9	1041.2	892.0	149.2	545.1	27.4%
LDW21-GT18-GB-0-1.5 ft	360.3	577.1	507.3	69.8	147.0	47.5%
LDW21-GT18-GB-0-6.5 ft	233.5	726.8	590.5	136.3	357.0	38.2%
LDW21-GT18-GB-6.5-8 ft	357.0	752.8	656.6	96.2	299.6	32.1%
LDW21-GT18-GB-6.5-16.5 ft	217.3	795.2	684.7	110.5	467.4	23.6%
LDW21-GT18-GB-16.5-18 ft	354.3	1016.0	893.3	122.7	539.0	22.8%
LDW21-GT18-GB-16.5-21.4 ft	10.2	159.2	118.5	40.7	108.3	37.6%
LDW21-GT18-GB-21.4-26.5 ft	690.5	1366.5	1179.1	187.4	488.6	38.4%
LDW21-GT18-GB-26.5-28 ft	359.5	929.9	801.2	128.7	441.7	29.1%
	_					
	_					
	LDW21-GT37-GB-0-1.5 ft LDW21-GT37-GB-10-11.5 ft LDW21-GT37-GB-10-20 ft LDW21-GT37-GB-20-21.5 ft LDW21-GT37-GB-30-31.5 ft LDW21-GT37-GB-30-31.5 ft LDW21-GT18-GB-0-1.5 ft LDW21-GT18-GB-6.5 ft LDW21-GT18-GB-6.5-8 ft LDW21-GT18-GB-6.5-16.5 ft LDW21-GT18-GB-16.5-18 ft LDW21-GT18-GB-16.5-18 ft LDW21-GT18-GB-16.5-21.4 ft LDW21-GT18-GB-16.5-21.4 ft LDW21-GT18-GB-16.5-21.4 ft	LDW21-GT37-GB-0-1.5 ft 233.7 LDW21-GT37-GB-10-11.5 ft 302.0 LDW21-GT37-GB-10-20 ft 234.3 LDW21-GT37-GB-20-21.5 ft 341.8 LDW21-GT37-GB-20-30 ft 316.0 LDW21-GT37-GB-30-31.5 ft 346.9 LDW21-GT18-GB-0-1.5 ft 360.3 LDW21-GT18-GB-0-6.5 ft 233.5 LDW21-GT18-GB-6.5-8 ft 357.0 LDW21-GT18-GB-6.5-16.5 ft 217.3 LDW21-GT18-GB-16.5-18 ft 354.3 LDW21-GT18-GB-16.5-21.4 ft 10.2 LDW21-GT18-GB-16.5-21.4 ft 690.5	LDW21-GT37-GB-0-1.5 ft 233.7 583.3 LDW21-GT37-GB-10-11.5 ft 302.0 688.9 LDW21-GT37-GB-10-20 ft 234.3 678.9 LDW21-GT37-GB-20-21.5 ft 341.8 864.9 LDW21-GT37-GB-20-30 ft 316.0 945.0 LDW21-GT37-GB-30-31.5 ft 346.9 1041.2 LDW21-GT18-GB-0-1.5 ft 360.3 577.1 LDW21-GT18-GB-0-6.5 ft 233.5 726.8 LDW21-GT18-GB-6.5-8 ft 357.0 752.8 LDW21-GT18-GB-6.5-16.5 ft 217.3 795.2 LDW21-GT18-GB-16.5-18 ft 354.3 1016.0 LDW21-GT18-GB-16.5-21.4 ft 10.2 159.2 LDW21-GT18-GB-21.4-26.5 ft 690.5 1366.5	LDW21-GT37-GB-0-1.5 ft 233.7 583.3 440.8 LDW21-GT37-GB-10-11.5 ft 302.0 688.9 534.6 LDW21-GT37-GB-10-20 ft 234.3 678.9 534.1 LDW21-GT37-GB-20-21.5 ft 341.8 864.9 644.8 LDW21-GT37-GB-20-30 ft 316.0 945.0 766.3 LDW21-GT37-GB-30-31.5 ft 346.9 1041.2 892.0 LDW21-GT18-GB-0-1.5 ft 360.3 577.1 507.3 LDW21-GT18-GB-0-6.5 ft 233.5 726.8 590.5 LDW21-GT18-GB-6.5-8 ft 357.0 752.8 656.6 LDW21-GT18-GB-6.5-16.5 ft 217.3 795.2 684.7 LDW21-GT18-GB-16.5-18 ft 354.3 1016.0 893.3 LDW21-GT18-GB-16.5-21.4 ft 10.2 159.2 118.5 LDW21-GT18-GB-21.4-26.5 ft 690.5 1366.5 1179.1	LDW21-GT37-GB-0-1.5 ft 233.7 583.3 440.8 142.5 LDW21-GT37-GB-10-11.5 ft 302.0 688.9 534.6 154.3 LDW21-GT37-GB-10-20 ft 234.3 678.9 534.1 144.8 LDW21-GT37-GB-20-21.5 ft 341.8 864.9 644.8 220.1 LDW21-GT37-GB-20-30 ft 316.0 945.0 766.3 178.7 LDW21-GT37-GB-30-31.5 ft 346.9 1041.2 892.0 149.2 LDW21-GT18-GB-0-1.5 ft 360.3 577.1 507.3 69.8 LDW21-GT18-GB-0-6.5 ft 233.5 726.8 590.5 136.3 LDW21-GT18-GB-6.5-8 ft 357.0 752.8 656.6 96.2 LDW21-GT18-GB-6.5-16.5 ft 217.3 795.2 684.7 110.5 LDW21-GT18-GB-16.5-18 ft 354.3 1016.0 893.3 122.7 LDW21-GT18-GB-16.5-21.4 ft 10.2 159.2 118.5 40.7 LDW21-GT18-GB-21.4-26.5 ft 690.5 1366.5 1179.1 187.4	LDW21-GT37-GB-0-1.5 ft 233.7 583.3 440.8 142.5 207.1 LDW21-GT37-GB-10-11.5 ft 302.0 688.9 534.6 154.3 232.6 LDW21-GT37-GB-10-20 ft 234.3 678.9 534.1 144.8 299.8 LDW21-GT37-GB-20-21.5 ft 341.8 864.9 644.8 220.1 303.0 LDW21-GT37-GB-20-30 ft 316.0 945.0 766.3 178.7 450.3 LDW21-GT37-GB-30-31.5 ft 346.9 1041.2 892.0 149.2 545.1 LDW21-GT18-GB-0-1.5 ft 360.3 577.1 507.3 69.8 147.0 LDW21-GT18-GB-0-6.5 ft 233.5 726.8 590.5 136.3 357.0 LDW21-GT18-GB-6.5-8 ft 357.0 752.8 656.6 96.2 299.6 LDW21-GT18-GB-6.5-16.5 ft 217.3 795.2 684.7 110.5 467.4 LDW21-GT18-GB-16.5-18 ft 354.3 1016.0 893.3 122.7 539.0 LDW21-GT18-GB-16.5-21.4 ft 10.2 159.2 118.5

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is

Reviewed by:



Moisture Content - ASTM D854

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: September 13, 2021	Tested by: A. Eifrig

I	l	I						I	Mass of	I	I	I	I	1 1
										Mass of			Temp.	1
				Mass of Dry		Mass of	Volume of		w/ water &					Corrected
Sample #	Location	Tare	Tare	Soil	Pycno ID	Pycno	Pycno	Water @ Tx		w/ water	*C	Soils	Factor	SpG
B21-1695	LDW21-GT37-GB-10-20 ft	493.21	568.13	74.9	TSA-013	184.0	499.7	0.99756	728.81	682.44				2.6224169
B21-1697	LDW21-GT37-GB-20-30 ft	497.94	575.45	77.5	TSA-011	190.3	499.5	0.99752	736.61	688.63	23.1	2.624687		2.6228759
B21-1700	LDW21-GT18-GB-0-6.5 ft	600.24	700.15	99.9	TSA-020	195.0	499.5	0.99752	753.52	693.28		2.5184539		2.5167161
B21-1702	LDW21-GT18-GB-6.5-16.5 ft	510.32	612.20	101.9	TSA-010	180.3	499.5	0.99754	742.28	678.62				2.6637535
B21-1705	LDW21-GT18-GB-21.4-26.5 ft	501.27	576.59	75.3	TSA-021	183.4	499.4	0.99745	727.11	681.56	23.4	2.5303609	0.99924	2.5284379
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All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:

Meghan Blodgett-Carrillo



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT37-GB-10-20 ft

Sample#: B21-1695

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 13-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Space

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{c} \textbf{AS IM D43I} \\ D_{(5)} = 0.003 \\ D_{(10)} = 0.007 \\ D_{(15)} = 0.016 \\ D_{(30)} = 0.057 \\ D_{(50)} = 0.097 \\ D_{(60)} = 0.124 \\ D_{(90)} = 0.386 \\ Pario = 21/47 \end{array}$ mm % Gravel = 0.5% % Sand = 57.8% mm % Silt & Clay = 41.7% mm mm Liquid Limit = 0.0% Plasticity Index = 0.0% mm Sand Equivalent = n/a mm

Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 3.61$ Coeff. of Uniformity, $C_U = 17.03$ Fineness Modulus = 0.59

Plastic Limit = 0.0% Moisture %, as sampled = 48.3% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

					D	ust Ratio = 21/47	Fracture %, 2+ Faces = n/a Req'd Fracture %, 2+ Faces =
				AS	TM C136, AS	TM D6913, ASTM C117	
			Interpolated				Grain Size Distribution
		Cumulative	Cumulative				·
Sieve	Size	Percent	Percent	Specs	Specs	b::	2 (4) (4) (4) (4) (4) (4) (4) (4
US	Metric	Passing	Passing	Max	Min	100%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
12.00"	300.00		100%	100.0%	0.0%		
10.00"	250.00		100%	100.0%	0.0%		
8.00"	200.00		100%	100.0%	0.0%	90%	90.0%
6.00"	150.00		100%	100.0%	0.0%		
4.00"	100.00		100%	100.0%	0.0%	80%	80.0%
3.00"	75.00		100%	100.0%	0.0%	80% F.T.	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
2.50"	63.00		100%	100.0%	0.0%	I .	-
2.00"	50.00	100%	100%	100.0%	0.0%	70%	70.0%
1.75"	45.00		100%	100.0%	0.0%		
1.50"	37.50		100%	100.0%	0.0%		
1.25"	31.50		100%	100.0%	0.0%	60%	
1.00"	25.00	100%	100%	100.0%	0.0%	D C	-
3/4"	19.00	100%	100%	100.0%	0.0%	01 180 48 50%	50.0%
5/8"	16.00		100%	100.0%	0.0%	le 30%	30.0%
1/2"	12.50	100%	100%	100.0%	0.0%		-
3/8"	9.50	100%	100%	100.0%	0.0%	40%	40.0%
1/4"	6.30		100%	100.0%	0.0%		
#4	4.75	99%	99%	100.0%	0.0%		
#8	2.36		99%	100.0%	0.0%	30%	30.0%
#10	2.00	99%	99%	100.0%	0.0%		
#16	1.18		96%	100.0%	0.0%	20%	20.0%
#20	0.850		95%	100.0%	0.0%	20%	
#30	0.600		94%	100.0%	0.0%		
#40	0.425	93%	93%	100.0%	0.0%	10%	10.0%
#50	0.300		83%	100.0%	0.0%		
#60	0.250		78%	100.0%	0.0%		
#80	0.180		72%	100.0%	0.0%	0%	100.000 10.000 1.000 0.100 0.010 0.001
#100	0.150	69%	69%	100.0%	0.0%		
#140	0.106		53%	100.0%	0.0%		Particle Size (mm)
#170	0.090		47%	100.0%	0.0%		
#200	0.075	41.7%	41.7%	100.0%	0.0%	+ Sieve Sizes	→ Max Specs
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				and ourselves, all reports are	submitted as the confide	ential property of clients, and authorization	for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written

Comments: Reviewed by:



Hydrometer Report

Project:	Q.C Lower	Duwamish Wat	erway Date Recei			assification Sys	stem, ASTM-2487
Project #: 1	21B233		Sampled	By: Client	SM, Silty Sand		
Client :	Anchor QEA		Date Tes	sted: 13-Sep-21	Sample Color		
Source:	LDW21-GT3	7-GB-10-20 ft	Tested E	By: C. Kriss	brown		
Sample#:	B21-1695			•			
A	STM D7928	3. HYDROME	TER ANALYSI	S		ASTM	D6913
Sp Gr :	2.62	-				Sieve A	
Sample Weight:	74.76	grams				Grain Size	•
Hydroscopic Moist.:	2.84%				Sieve	Percent	Soils Particle
Adj. Sample Wgt :	72.70	grams		ACCREDITED	Size	Passing	Diameter
and a market wight	7-114	8		Certificate #: 1366.01	3.0"	100%	75.000 mm
Hydrometer					2.0"	100%	50.000 mm
Reading	Corrected	Percent	Soils Particle		1.5"	100%	37.500 mm
Minutes	Reading	Passing	Diameter		1.25"	100%	31.500 mm
1	18.5	25.6%	0.0505 mm		1.0"	100%	25.000 mm
2	15.5	21.4%	0.0364 mm		3/4"	100%	19.000 mm
5	13.5	18.7%	0.0234 mm		5/8"	100%	16.000 mm
15	10	13.8%	0.0137 mm		1/2"	100%	12.500 mm
30	9	12.4%	0.0097 mm		3/8"	100%	9.500 mm
60	7	9.7%	0.0097 mm		1/4"	100%	6.300 mm
240	4	5.5%	0.0070 mm		#4	99%	4.750 mm
	1						
1440	1	1.4%	0.0015 mm		#10	99%	2.000 mm
N/ G 1	0.50/				#20	95%	0.850 mm
% Gravel:	0.5%		iquid Limit: 0.0 %		#40	93%	0.425 mm
% Sand:	57.8%		lastic Limit: 0.0 %		#100	69%	0.150 mm
% Silt:	34.4%	Plas	ticity Index: 0.0 %		#200	41.7%	0.075 mm
% Clay:	7.3%				Silts	41.1%	0.074 mm
						24.3%	0.050 mm
						17.0%	0.020 mm
					Clays	7.3%	0.005 mm
						2.5%	0.002 mm
					Colloids	0.9%	0.001 mm
	USDA S	oil Textural C	Classification				
	<u>-</u>	Particle Size					
% Sand:		2.0 - 0.05 mm					
% Silt:		0.05 - 0.002 mm	ı				
% Clay:		< 0.002 mm					
	USDA S	oil Textural C	lassification				
		Loamy Sand					
All condenses by solve to the CO			-E	all and a second and a second	64-4-1	-1-4-5-6-6-75	
regarding our reports is reserved pend			chenis, the public and ourselves,	an reports are submitted as the con	ildential property of clients,	and authorization for public	ation of statements, conclusions or extracts from or
Comments:							
	,	011					
	March Al	abget arillo					
Daviawad b	Chall St	1					
Reviewed by:	Manhan Dla 1	t Camilla					

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1695
Sample Date:	7/14/2021
Test Date:	9/16/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT37-GB-10-20 ft

 Visual Soil Description:
 brown silty sand

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

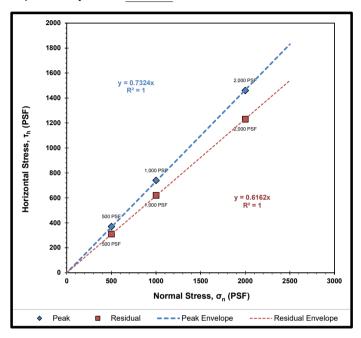
Specimen Height (in): 1
Rate of Strain (in/min): 0.0208
Estimated Specific Gravity of Solids: 2.65

Summary of Sample	e Data:	σ _n =500 PSF
Initial Moisture Content (%):	35.3	
	Initial	Post-Consolidation
Dry Density (PCF):	100.7	102.8
Void Ratio:	0.673	0.639
Porosity (%):	40.2	39.0
Degree of Saturation (%):	saturated	saturated

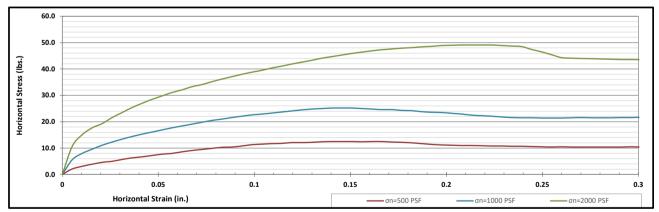
Summary of Samp	le Data:	σ _n =1000 PSF				
Initial Moisture Content (%):	36.0					
	Initial	Post-Consolidation				
Dry Density (PCF):	100.9	110.5				
Void Ratio:	0.670	0.525				
Porosity (%):	40.1	34.4				
Degree of Saturation (%):	saturated	saturated				

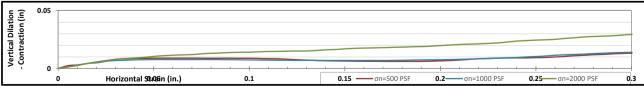
Summary of Sample	e Data:	σ _n =2000 PSF
Initial Moisture Content (%):	35.4	
	Initial	Post-Consolidation
Dry Density (PCF):	101.4	114.5
Void Ratio:	0.662	0.471
Porosity (%):	39.8	32.0
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS									
	PEAK	RESIDUAL							
Angle of Internal Friction, φ (°):	36	32							
Cohesion (PSF):	0	0							



Failure Envelope Test Values:										
Normal Stress, σ _n (PSF):	500	1000	2000							
Peak Horizontal Stress, τ _h (PSF):	370	740	1460							
Residual Horizontal Stress, τ _h (PSF):	310	620	1230							





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT37-GB-20-30 ft

Sample#: B21-1697

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 13-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

brown



100.0%

80.0%

70.0%

50.0%

30.0%

20.0% 10.0%

ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D43} \\ \textbf{D}_{(5)} = 0.013 \\ \textbf{D}_{(10)} = 0.025 \\ \textbf{D}_{(15)} = 0.038 \\ \textbf{D}_{(30)} = 0.077 \\ \textbf{D}_{(50)} = 0.165 \\ \textbf{D}_{(60)} = 0.234 \\ \textbf{D}_{(90)} = 0.767 \\ \textbf{Partio} = 1/3 \\ \textbf{D}_{(40)} = 0.767 \\ \textbf{D}_{$ mm % Gravel = 0.2% % Sand = 70.3% mm % Silt & Clay = 29.5% mm mm Liquid Limit = 0.0% Plasticity Index = 0.0% mm Sand Equivalent = n/a mm

Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 1.00$ Coeff. of Uniformity, $C_U = 9.20$ Fineness Modulus = 1.03

Plastic Limit = 0.0% Moisture %, as sampled = 39.7% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

						D(90) 01707		1144							
						Ratio = 1/3		Fractu	re %, 2+ Fa	ces = n/a	F	teq'd F	racture	%, 2-	+ Face
				AS	STM C136, ASTM	D6913, AST	M C117								
		Actual	Interpolated					Gro	ain Size Distribu	tion					
		7	Cumulative					E+							
Sieve		Percent	Percent	Specs	Specs				3/8: 4	5 5883	8388888	1			
US	Metric	Passing	Passing	Max	Min		100%				+++++	·	т т	ттт	Т
12.00"	300.00		100%	100.0%	0.0%		FI								1 1
10.00"	250.00		100%	100.0%	0.0%		[]			N. III					- 1
8.00"	200.00		100%	100.0%	0.0%		90%			Ĭ'n.		M		TTT	
6.00"	150.00		100%	100.0%	0.0%		11			1					
4.00"	100.00		100%	100.0%	0.0%		80%					ШШ		Ш	
3.00"	75.00		100%	100.0%	0.0%		t l				M				1 1
2.50"	63.00		100%	100.0%	0.0%		H				\				1 1
2.00"	50.00	100%	100%	100.0%	0.0%		70%				-			₩₩	
1.75"	45.00		100%	100.0%	0.0%		F								1 1
1.50"	37.50		100%	100.0%	0.0%		11								- 1
1.25"	31.50		100%	100.0%	0.0%		60%				1	HHH	1 1	+++	
1.00"	25.00	100%	100%	100.0%	0.0%	.E	t I				. \				
3/4"	19.00	100%	100%	100.0%	0.0%	% Possing	50%								
5/8"	16.00		100%	100.0%	0.0%	84	- I								1 1
1/2"	12.50	100%	100%	100.0%	0.0%		F				. \				1 1
3/8"	9.50	100%	100%	100.0%	0.0%		40%				++++++++++++++++++++++++++++++++++++				1
1/4"	6.30		100%	100.0%	0.0%		11								- 1 1
#4	4.75	100%	100%	100.0%	0.0%		t I								
#8	2.36		98%	100.0%	0.0%		30%				*	 	+-++	+++	+++
#10	2.00	98%	98%	100.0%	0.0%		ł I								1 1
#16	1.18		93%	100.0%	0.0%		20%								1 1
#20	0.850		91%	100.0%	0.0%		^{20%} F							ПП	I
#30	0.600		89%	100.0%	0.0%		FI								1
#40	0.425	88%	88%	100.0%	0.0%		10%							###	1
#50	0.300		70%	100.0%	0.0%		ļ								1
#60	0.250		62%	100.0%	0.0%		t I								
#80	0.180		52%	100.0%	0.0%		0%	.000	10.000	1.000	0.100	,	0.010		0.00
#100	0.150	48%	48%	100.0%	0.0%		100		10.000	1.500	0.100		5.010		0.00
#140	0.106		37%	100.0%	0.0%				Particle Size	(mm)					
#170	0.090		33%	100.0%	0.0%										
#200	0.075	29.5%	29.5%	100.0%	0.0%	+	Sieve Sizes		Max Specs		Min Specs	_	Sie	eve Resi	ults

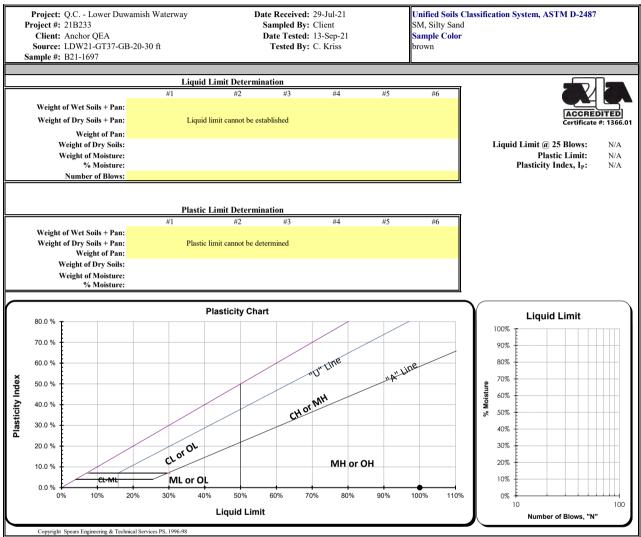
Comments:

Meghan Blodgett-Carrillo

Reviewed by:



ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils



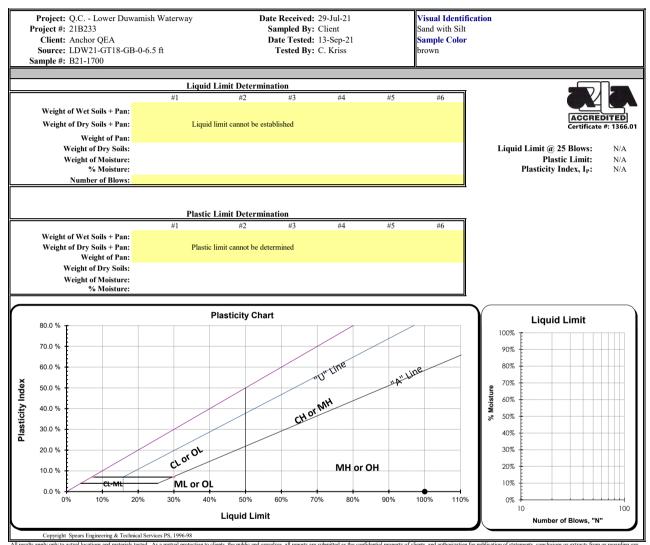
All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our

Comments: Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the liquid limit cup without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

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ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils



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Comments: Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the liquid limit cup without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT18-GB-6.5-16.5 ft

Sample#: B21-1702

Reviewed by:

Meghan Blodgett-Carrillo

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 13-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SP, Poorly graded Sand

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Space

Sample Meets Specs? N/A

 $\begin{array}{c} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.136 \\ \textbf{D}_{(10)} = 0.168 \\ \textbf{D}_{(15)} = 0.190 \\ \textbf{D}_{(30)} = 0.255 \\ \textbf{D}_{(50)} = 0.342 \\ \textbf{D}_{(60)} = 0.385 \\ \textbf{D}_{(90)} = 1.497 \\ \textbf{D}_{(50)} = 0.1497 \\ \textbf{D}_{(5$ mm % Gravel = 0.0% % Sand = 98.7% mm % Silt & Clay = 1.3% mm mm Liquid Limit = n/a Plasticity Index = n/amm mm

Sand Equivalent = n/a Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 1.00$ Coeff. of Uniformity, $C_U = 2.29$ Fineness Modulus = 1.97

Plastic Limit = n/a Moisture %, as sampled = 23.6% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

						$D_{(90)} = 1.497$	mm	Fracture %, 1 Face = n/a		eq a Fracture %, 1 Fa	
						ust Ratio = 1/54	G11=	Fracture %, 2+ Faces = n/a	Req'o	d Fracture %, 2+ Fa	ces =
		A -41	I-4	AS	STM C136, AS	FM D6913, ASTM	C117				
		Actual	Interpolated			ľ		Grain Size Distribution			
~	CI.	7	Cumulative			-		÷4 .			
Sieve		Percent	Percent	Specs	Specs		5 % % 4	37. 17. 17. 17. 17. 17. 17. 17. 1	83558		
US	Metric	Passing	Passing	Max	Min	1	100%		* ** ***		T 100.0%
12.00"	300.00		100%	100.0%	0.0%						1
10.00"	250.00		100%	100.0%	0.0%		90%				90.0%
8.00"	200.00		100%	100.0%	0.0%		90%				90.0%
6.00"	150.00		100%	100.0%	0.0%						1
4.00"	100.00		100%	100.0%	0.0%		80%	IIII V			80.0%
3.00"	75.00		100%	100.0%	0.0%						1
2.50"	63.00		100%	100.0%	0.0%						1
2.00"	50.00	100%	100%	100.0%	0.0%		70%			+	70.0%
1.75"	45.00		100%	100.0%	0.0%						1
1.50"	37.50		100%	100.0%	0.0%						1
1.25"	31.50		100%	100.0%	0.0%	1	60%				60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	% Possing					50.0%
3/4"	19.00	100%	100%	100.0%	0.0%	8	50%				50.0%
5/8"	16.00		100%	100.0%	0.0%	8.					1
1/2"	12.50	100%	100%	100.0%	0.0%						1
3/8"	9.50	100%	100%	100.0%	0.0%		40%	 		+	40.0%
1/4"	6.30		100%	100.0%	0.0%						1
#4	4.75	100%	100%	100.0%	0.0%				(1
#8	2.36		100%	100.0%	0.0%		30%		•		30.0%
#10	2.00	100%	100%	100.0%	0.0%				\		1
#16	1.18		84%	100.0%	0.0%		20%				20.0%
#20	0.850		77%	100.0%	0.0%				1		1
#30	0.600		73%	100.0%	0.0%				1		1
#40	0.425	69%	69%	100.0%	0.0%		10%		-1	+	10.0%
#50	0.300		40%	100.0%	0.0%				\		1
#60	0.250		29%	100.0%	0.0%						1
#80	0.180		13%	100.0%	0.0%		0%	1000 10.000 1.000	0.100	0.010	0.0%
#100	0.150	6%	6%	100.0%	0.0%						
#140	0.106		3%	100.0%	0.0%			Particle Size (mm)			
#170	0.090		2%	100.0%	0.0%						
#200	0.075	1.3%	1.3%	100.0%	0.0%	+ Si	ieve Sizes	— Max Specs —— M	in Specs	Sieve Results	
Copyright	Spears Engineering & Tec	chnical Services PS, 1996-9	98								

Comments:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT18-GB-16.5-21.4 ft

Sample#: B21-1704

#140

#170

#200

0.106

0.090

0.075

Meghan Blodgett-Carrillo

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 13-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Space

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{AS IM D43} \\ \textbf{D}_{(5)} = 0.005 \\ \textbf{D}_{(10)} = 0.014 \\ \textbf{D}_{(15)} = 0.038 \\ \textbf{D}_{(30)} = 0.081 \\ \textbf{D}_{(50)} = 0.122 \\ \textbf{D}_{(60)} = 0.142 \\ \textbf{D}_{(90)} = 0.351 \end{array}$ mm % Gravel = 0.0% % Sand = 72.8% mm % Silt & Clay = 27.2% mm mm Liquid Limit = 0.0% mm Plasticity Index = 0.0% mm

Sand Equivalent = n/a ce = n/a = n/a

Coeff. of Curvature, $C_C = 3.31$ Coeff. of Uniformity, $C_U = 10.24$ Fineness Modulus = 0.53

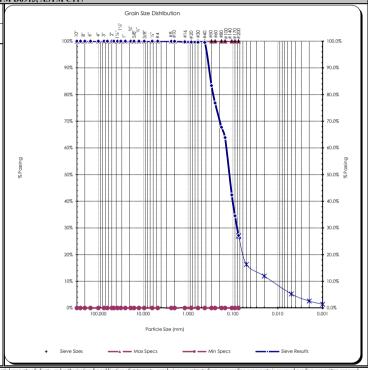
Plastic Limit = 0.0% Moisture %, as sampled = 37.6% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

						$D_{(90)} = 0.351$	mm	Fr	racture %,	1 Face =
					Dι	ust Ratio = 3/11		Frac	ture %, 2+	- Faces =
				AS	STM C136, AST	TM D6913, ASTM	C117			
		Actual	Interpolated						Grain Size Dist	tribution
			Cumulative		T			Ę.,		
	Size	Percent	Percent	Specs	Specs		b in :	7 % 2 3 4 ¢	\$6. 6 1 4	e2 2 ### ##
US	Metric	Passing	Passing	Max	Min		100%			
12.00"	300.00		100%	100.0%	0.0%		- F I			
10.00"	250.00		100%	100.0%	0.0%					
8.00"	200.00		100%	100.0%	0.0%		90%		 	111
6.00"	150.00		100%	100.0%	0.0%					
4.00"	100.00		100%	100.0%	0.0%		80%			
3.00"	75.00		100%	100.0%	0.0%		1			
2.50"	63.00		100%	100.0%	0.0%		- F I			
2.00"	50.00	100%	100%	100.0%	0.0%		70%			
1.75"	45.00		100%	100.0%	0.0%					
1.50"	37.50		100%	100.0%	0.0%		11			
1.25"	31.50		100%	100.0%	0.0%		60%		 	
1.00"	25.00	100%	100%	100.0%	0.0%		l l			
3/4"	19.00	100%	100%	100.0%	0.0%	% Possing	50%			
5/8"	16.00		100%	100.0%	0.0%	96	50%			
1/2"	12.50	100%	100%	100.0%	0.0%		- []			
3/8"	9.50	100%	100%	100.0%	0.0%		40%			├
1/4"	6.30		100%	100.0%	0.0%					
#4	4.75	100%	100%	100.0%	0.0%					
#8	2.36		100%	100.0%	0.0%		30%			
#10	2.00	100%	100%	100.0%	0.0%		l l			
#16	1.18		100%	100.0%	0.0%		20%			
#20	0.850		100%	100.0%	0.0%					
#30	0.600		100%	100.0%	0.0%		F			
#40	0.425	100%	100%	100.0%	0.0%		10%			├
#50	0.300		83%	100.0%	0.0%					
#60	0.250		77%	100.0%	0.0%					
#80	0.180		68%	100.0%	0.0%		0%	100.000	10.000	-
#100	0.150	64%	64%	100.0%	0.0%					
		1				II .			D-4-1	- Ci ()

100.0%

100.0%

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0.0%

0.0%

0.0%

Comments: Reviewed by:

42%

35%

27.2%



Hydrometer Report

		Duwamish Wat	terway Date Recei			assification Syst	tem, ASTM-2487
Project #: 2	21B233		Sampled	By: Client	SM, Silty Sand		
Client :	Anchor QEA		Date Tes	sted: 1-Sep-21	Sample Color		
Source:	LDW21-GT1	8-GB-16.5-21.4	ft Tested	By: C. Kriss	brown		
Sample#: 1	B21-1704			•			
		HADDOWE	ETER ANALYSI	9		ASTM	D6013
Sp Gr :	2.53	, III DROMI	TER ANALISI			Sieve A	
-							•
Sample Weight:	99.41	grams				Grain Size D	
Hydroscopic Moist.:	2.98%				Sieve	Percent	Soils Particle
Adj. Sample Wgt :	96.53	grams		Certificate #: 1366.01	Size	Passing	Diameter
				Certificate #. 1500.01	3.0"	100%	75.000 mm
Hydrometer					2.0"	100%	50.000 mm
Reading	Corrected	Percent	Soils Particle		1.5"	100%	37.500 mm
Minutes	Reading	Passing	Diameter		1.25"	100%	31.500 mm
1	17	18.1%	0.0526 mm		1.0"	100%	25.000 mm
2	14	14.9%	0.0379 mm		3/4"	100%	19.000 mm
5	12.5	13.3%	0.0242 mm		5/8"	100%	16.000 mm
15	9.5	10.1%	0.0142 mm		1/2"	100%	12.500 mm
30	8	8.5%	0.0101 mm		3/8"	100%	9.500 mm
60	6.5	6.9%	0.0072 mm		1/4"	100%	6.300 mm
240	4	4.3%	0.0036 mm		#4	100%	4.750 mm
1440	2	2.1%	0.0015 mm		#10	100%	2.000 mm
a/ G 1	0.00/				#20	100%	0.850 mm
% Gravel:	0.0%		iquid Limit: 0.0 %		#40	100%	0.425 mm
% Sand:	72.8%		lastic Limit: 0.0 %		#100	64%	0.150 mm
% Silt:	21.9%	Plas	ticity Index: 0.0 %		#200	27.2%	0.075 mm
% Clay:	5.3%				Silts	26.8%	0.074 mm
						16.4%	0.050 mm
					CI.	12.0%	0.020 mm
					Clays	5.3%	0.005 mm
					6 11 11	2.6%	0.002 mm
					Colloids	1.4%	0.001 mm
	USDA S	oil Textural (Classification				
		Particle Size					
% Sand:		2.0 - 0.05 mm					
% Silt:		0.05 - 0.002 mm	1				
% Clay:		< 0.002 mm					
	USDA S	oil Textural C	Classification				
		Loamy Sand					
All results apply only to actual location regarding our reports is reserved pend			clients, the public and ourselves,	all reports are submitted as the co	nfidential property of clients,	and authorization for publica	tion of statements, conclusions or extracts from or
	0 11						
Comments:							
	1 10	adjet arillo					
	(Yogh the	reget and o					
Reviewed by:		0					
	Meghan Blodgett	t-Carrillo					

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1704
Sample Date:	7/14/2021
Test Date:	9/17/2021
Technician:	M. Carrillo

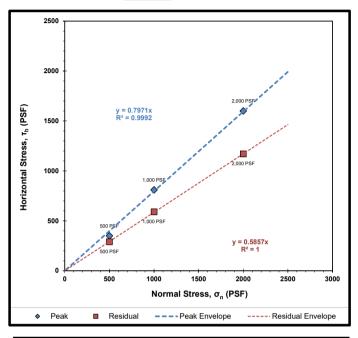
| Specimen Diameter (in): 2.5 | Specimen Height (in): 1 | Rate of Strain (in/min): 0.0208 | Estimated Specific Gravity of Solids: 2.65

Summary of Sample	Data:	σ _n =500 PSF
Initial Moisture Content (%):	29.4	
	Initial	Post-Consolidation
Dry Density (PCF):	107.0	107.9
Void Ratio:	0.575	0.562
Porosity (%):	36.5	36.0
Degree of Saturation (%):	saturated	saturated

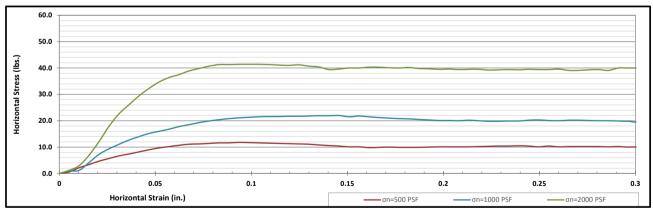
Summary of Sample	Data:	σ _n =1000 PSF
Initial Moisture Content (%):	28.3	
	Initial	Post-Consolidation
Dry Density (PCF):	107.4	109.9
Void Ratio:	0.569	0.533
Porosity (%):	36.3	34.8
Degree of Saturation (%):	saturated	saturated

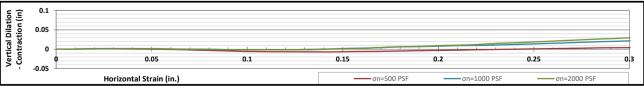
Summary of Sample	e Data:	σ _n =2000 PSF
Initial Moisture Content (%):	29.0	
	Initial	Post-Consolidation
Dry Density (PCF):	106.9	110.5
Void Ratio:	0.576	0.525
Porosity (%):	36.5	34.4
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRI	ENGTH PARA	METERS
	PEAK	RESIDUAL
Angle of Internal Friction, φ (°):	39	30
Cohesion (PSF):	0	0



Failure Envelope Test Values:							
Normal Stress, σ _n (PSF):	500	1000	2000				
Peak Horizontal Stress, τ _h (PSF):	350	810	1600				
Residual Horizontal Stress, τ _h (PSF):	290	590	1170				





Corporate • 777 Chrysler Drive • Burlington, WA 98233 • Phone 360.755.1990 • Fax 360.755.1980 SW Region • 2118 Black Lake Blvd. S.W.• Olympia, WA 98512 • Phone 360.534.9777 • Fax 360.534.9779 NW Region • 805 Dupont, Suite #5 • Bellingham, WA 98225 • Phone 360.647.6061 • Fax 360.647.8111 Kitsap Region • 5451 N.W. Newberry Hill Road, Suite 101 • Silverdale, WA 98383 • Phone/Fax 360.698.6787



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT18-GB-21.4-26.5 ft

Sample#: B21-1705

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 13-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{c} \textbf{AS IM D43I} \\ D_{(5)} = 0.013 \\ D_{(10)} = 0.025 \\ D_{(15)} = 0.038 \\ D_{(30)} = 0.076 \\ D_{(50)} = 0.128 \\ D_{(60)} = 0.162 \\ D_{(90)} = 0.393 \\ Pario = 23/73 \end{array}$ mm % Gravel = 0.7% % Sand = 69.6% mm % Silt & Clay = 29.7% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a mm

Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 1.41$ Coeff. of Uniformity, $C_U = 6.40$ Fineness Modulus = 0.74

Plastic Limit = n/a Moisture %, as sampled = 38.4% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

					Di	ust Ratio = 23/73	Fracture %, 2+ Fa	ces = n/a	Req'd Fracture %, 2+ I	aces =
				AS	TM C136, AST	TM D6913, ASTM C117				
		Actual	Interpolated				Grain Size Distribut	ion		
G1	G:		Cumulative		-	4	₹ .			
Sieve		Percent	Percent	Specs	Specs	Ď 16 S	7.7. 7.7. 7.7. 7.7. 7.7. 7.7. 7.7. 7.7	5 588 48888	<u>288</u>	
US	Metric	Passing	Passing	Max	Min	100%		· • • • • • • • • • • • • • • • • • • •	***	T 100.0%
12.00"	300.00		100%	100.0%	0.0%	I				1
10.00"	250.00		100%	100.0%	0.0%	I				1
8.00"	200.00		100%	100.0%	0.0%	90%				90.0%
6.00"	150.00		100%	100.0%	0.0%					1
4.00"	100.00		100%	100.0%	0.0%	80%				80.0%
3.00"	75.00		100%	100.0%	0.0%	1				1
2.50"	63.00		100%	100.0%	0.0%	 				1
2.00"	50.00	100%	100%	100.0%	0.0%	70%		 		70.0%
1.75"	45.00		100%	100.0%	0.0%			 		1
1.50"	37.50		100%	100.0%	0.0%			<u> </u>		1
1.25"	31.50		100%	100.0%	0.0%	60%		 		60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	<u>e</u>				. Bu
3/4"	19.00	100%	100%	100.0%	0.0%	50 S S S S S S S S S S S S S S S S S S S				50.0%
5/8"	16.00		100%	100.0%	0.0%	BR 30%				30.0% 80
1/2"	12.50	100%	100%	100.0%	0.0%	I				1
3/8"	9.50	100%	100%	100.0%	0.0%	40%				40.0%
1/4"	6.30		100%	100.0%	0.0%				X III III III III III III III III III I	1
#4	4.75	99%	99%	100.0%	0.0%				1	1
#8	2.36		99%	100.0%	0.0%	30%			***************************************	30.0%
#10	2.00	99%	99%	100.0%	0.0%	 				1
#16	1.18		96%	100.0%	0.0%					1
#20	0.850		95%	100.0%	0.0%	20%				20.0%
#30	0.600		95%	100.0%	0.0%					1
#40	0.425	94%	94%	100.0%	0.0%	10%				10.0%
#50	0.300		78%	100.0%	0.0%					1
#60	0.250		71%	100.0%	0.0%	<u> </u>				1
#80	0.180		62%	100.0%	0.0%	0%	100.000 10.000	5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1.100 0.010	0.0%
#100	0.150	58%	58%	100.0%	0.0%		100.000	1.000 0	.100 0.010	0.001
#140	0.106	****	42%	100.0%	0.0%		Particle Size	(mm)		
#170	0.090		35%	100.0%	0.0%					
#200	0.075	29.7%	29.7%	100.0%	0.0%	◆ Sieve Sizes	─ ▲ ─ Max Specs	- Min Spec	s Sieve Results	
	Spears Engineering & Tech		1	100.070	3.070					
11 0	1 0 0			and ourselves, all reports are s	arbmitted as the confide	ntial property of clients, and authorization	for publication of statements, conclus	ions or extracts from or re	garding our reports is reserved pendin	g our written annre

Reviewed by: _ Meghan Blodgett-Carrillo



Client:	Anchor QEA	Date: October 6, 2021	
Address:	21328 2nd Drive SE	Project:	Q.C Lower Duwamish Waterway
	Bothell, WA 98021	Project #:	21B233
Attn:	Garrett Timm	Sample #:	B21-1787-1803
Revised on:		Date sampled:	7-12-21 & 7-14-21

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	Please See Attached Reports		Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count			LA Abrasion	
X	Moisture Content	Please See Attached Report	X	Direct Shear	Please See Attached Reports
	Specific Gravity, Coarse		X	Specific Gravity, Soils	Please See Attached Reports
	Specific Gravity, Fine				
X	Hydrometer Analysis	Please See Attached Reports			
X	Atterberg Limits	Please See Attached Reports			

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted, Meghan Blodgett-Carrillo

WABO Supervising Laboratory Technician



Moisture Content - ASTM C566, ASTM D2216

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	-
Date Received: July 29, 2021	Sampled by: Client
Date Tested: September 20, 2021	Tested by: A. Eifrig

Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
LDW21-GT15-GB-0-7.5 ft	233.4	1016.2	787.2	229.0	553.8	41.4%
LDW21-GT15-GB-7.5-9 ft	306.7	450.8	422.5	28.3	115.8	24.4%
LDW21-GT15-GB-7.5-15 ft	236.2	1288.2	1043.0	245.2	806.8	30.4%
LDW21-GT15-GB-15-17.5 ft	303.3	997.2	810.9	186.3	507.6	36.7%
LDW21-GT15-GB-17.5-19 ft	311.1	465.1	434.0	31.1	122.9	25.3%
LDW21-GT15-GB-17.5-25.4 ft	270.2	882.6	747.4	135.2	477.2	28.3%
LDW21-GT15-GB-25.4-27.5 ft	260.6	1270.0	1036.1	233.9	775.5	30.2%
LDW21-GT15-GB-27.5-29 ft	222.9	616.1	520.8	95.3	297.9	32.0%
LDW21-GT29-GB-0-1.5 ft	225.1	949.8	644.5	305.3	419.4	72.8%
LDW21-GT29-GB-0-10.6 ft	221.7	746.6	548.6	198.0	326.9	60.6%
LDW21-GT29-GB-11-12.5 ft	221.4	1082.5	801.0	281.5	579.6	48.6%
LDW21-GT29-GB-11-21 ft	224.4	738.0	646.6	91.4	422.2	21.6%
LDW21-GT29-GB-21-22.5 ft	222.3	408.6	349.3	59.3	127.0	46.7%
LDW21-GT29-GB-21-26 ft	233.8	1031.7	903.6	128.1	669.8	19.1%
LDW21-GT29-GB-26-28.9 ft	229.1	776.5	629.0	147.5	399.9	36.9%
LDW21-GT29-GB-28.9-31 ft	188.4	1285.9	988.6	297.3	800.2	37.2%
LDW21-GT29-GB-31-32.5 ft	225.3	925.7	756.5	169.2	531.2	31.9%
	_		-			
	LDW21-GT15-GB-0-7.5 ft LDW21-GT15-GB-7.5-9 ft LDW21-GT15-GB-7.5-15 ft LDW21-GT15-GB-15-17.5 ft LDW21-GT15-GB-17.5-19 ft LDW21-GT15-GB-17.5-25.4 ft LDW21-GT15-GB-25.4-27.5 ft LDW21-GT15-GB-25.4-27.5 ft LDW21-GT29-GB-0-1.5 ft LDW21-GT29-GB-0-10.6 ft LDW21-GT29-GB-11-21 ft LDW21-GT29-GB-11-21 ft LDW21-GT29-GB-21-22.5 ft LDW21-GT29-GB-21-26 ft LDW21-GT29-GB-28-21-26 ft LDW21-GT29-GB-26-28.9 ft LDW21-GT29-GB-28-9-31 ft	LDW21-GT15-GB-0-7.5 ft 233.4 LDW21-GT15-GB-7.5-9 ft 306.7 LDW21-GT15-GB-7.5-15 ft 236.2 LDW21-GT15-GB-15-17.5 ft 303.3 LDW21-GT15-GB-17.5-19 ft 311.1 LDW21-GT15-GB-17.5-25.4 ft 270.2 LDW21-GT15-GB-27.5-29 ft 222.9 LDW21-GT15-GB-27.5-29 ft 222.9 LDW21-GT29-GB-0-1.5 ft 225.1 LDW21-GT29-GB-0-10.6 ft 221.7 LDW21-GT29-GB-11-12.5 ft 224.4 LDW21-GT29-GB-11-21 ft 224.4 LDW21-GT29-GB-21-22.5 ft 222.3 LDW21-GT29-GB-21-26 ft 233.8 LDW21-GT29-GB-26-28.9 ft 229.1 LDW21-GT29-GB-28-9-31 ft 188.4	LDW21-GT15-GB-0-7.5 ft 233.4 1016.2 LDW21-GT15-GB-7.5-9 ft 306.7 450.8 LDW21-GT15-GB-7.5-15 ft 236.2 1288.2 LDW21-GT15-GB-15-17.5 ft 303.3 997.2 LDW21-GT15-GB-17.5-19 ft 311.1 465.1 LDW21-GT15-GB-17.5-25.4 ft 270.2 882.6 LDW21-GT15-GB-25.4-27.5 ft 260.6 1270.0 LDW21-GT15-GB-27.5-29 ft 222.9 616.1 LDW21-GT29-GB-0-1.5 ft 225.1 949.8 LDW21-GT29-GB-0-10.6 ft 221.7 746.6 LDW21-GT29-GB-11-12.5 ft 221.4 1082.5 LDW21-GT29-GB-11-21 ft 224.4 738.0 LDW21-GT29-GB-21-22.5 ft 222.3 408.6 LDW21-GT29-GB-21-22.5 ft 233.8 1031.7 LDW21-GT29-GB-26-28.9 ft 229.1 776.5 LDW21-GT29-GB-28-9-31 ft 188.4 1285.9	LDW21-GT15-GB-0-7.5 ft 233.4 1016.2 787.2 LDW21-GT15-GB-7.5-9 ft 306.7 450.8 422.5 LDW21-GT15-GB-7.5-15 ft 236.2 1288.2 1043.0 LDW21-GT15-GB-15-17.5 ft 303.3 997.2 810.9 LDW21-GT15-GB-17.5-19 ft 311.1 465.1 434.0 LDW21-GT15-GB-17.5-25.4 ft 270.2 882.6 747.4 LDW21-GT15-GB-25.4-27.5 ft 260.6 1270.0 1036.1 LDW21-GT15-GB-27.5-29 ft 222.9 616.1 520.8 LDW21-GT29-GB-0-1.5 ft 225.1 949.8 644.5 LDW21-GT29-GB-0-10.6 ft 221.7 746.6 548.6 LDW21-GT29-GB-11-12.5 ft 221.4 1082.5 801.0 LDW21-GT29-GB-21-22.5 ft 222.3 408.6 349.3 LDW21-GT29-GB-21-22.5 ft 222.3 408.6 349.3 LDW21-GT29-GB-26-28.9 ft 229.1 776.5 629.0 LDW21-GT29-GB-26-28.9 ft 188.4 1285.9 988.6	LDW21-GT15-GB-0-7.5 ft 233.4 1016.2 787.2 229.0 LDW21-GT15-GB-7.5-9 ft 306.7 450.8 422.5 28.3 LDW21-GT15-GB-7.5-15 ft 236.2 1288.2 1043.0 245.2 LDW21-GT15-GB-15-17.5 ft 303.3 997.2 810.9 186.3 LDW21-GT15-GB-17.5-19 ft 311.1 465.1 434.0 31.1 LDW21-GT15-GB-17.5-25.4 ft 270.2 882.6 747.4 135.2 LDW21-GT15-GB-25.4-27.5 ft 260.6 1270.0 1036.1 233.9 LDW21-GT15-GB-27.5-29 ft 222.9 616.1 520.8 95.3 LDW21-GT29-GB-0-1.5 ft 225.1 949.8 644.5 305.3 LDW21-GT29-GB-0-10.6 ft 221.7 746.6 548.6 198.0 LDW21-GT29-GB-11-12.5 ft 221.4 1082.5 801.0 281.5 LDW21-GT29-GB-21-22.5 ft 222.3 408.6 349.3 59.3 LDW21-GT29-GB-21-26 ft 233.8 1031.7 903.6 128.1 LDW21-GT29-GB-26-28.9 ft	LDW21-GT15-GB-0-7.5 ft 233.4 1016.2 787.2 229.0 553.8 LDW21-GT15-GB-7.5-9 ft 306.7 450.8 422.5 28.3 115.8 LDW21-GT15-GB-7.5-15 ft 236.2 1288.2 1043.0 245.2 806.8 LDW21-GT15-GB-15-17.5 ft 303.3 997.2 810.9 186.3 507.6 LDW21-GT15-GB-17.5-19 ft 311.1 465.1 434.0 31.1 122.9 LDW21-GT15-GB-17.5-25.4 ft 270.2 882.6 747.4 135.2 477.2 LDW21-GT15-GB-25.4-27.5 ft 260.6 1270.0 1036.1 233.9 775.5 LDW21-GT15-GB-27.5-29 ft 222.9 616.1 520.8 95.3 297.9 LDW21-GT29-GB-0-1.5 ft 225.1 949.8 644.5 305.3 419.4 LDW21-GT29-GB-0-10.6 ft 221.7 746.6 548.6 198.0 326.9 LDW21-GT29-GB-11-21 ft 224.4 738.0 646.6 91.4 422.2 LDW21-GT29-GB-21-22.5 ft 222.3 408.6 349.

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:



Moisture Content - ASTM D854

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: September 20, 2021	Tested by: A. Eifrig

Sample #	Location	Tare	Tare	Mass of Dry Soil	Pycno ID	Mass of Pycno	Volume of Pycno	Water @ Tx	w/ water & soils	w/ water	Water, 0.1 *C	SpG of Soils	Factor	Corrected SpG
B21-1787	LDW21-GT15-GB-0-7.5 ft	584.26	658.50	74.2	TSA-014	192.3	499.5	0.99749	735.04	690.54	23.2	2.4966051	0.99929	2.4948325
B21-1792	LDW21-GT15-GB-17.5-25.4 ft	493.62	594.11	100.5	TSA-016	197.2	499.5	0.99754	757.82	695.45	23.0	2.6360571	0.99933	2.634291
B21-1793	LDW21-GT15-GB-25.4-27.5 ft	500.82	575.98	75.2	TSA-022	198.0	499.5	0.99749	740.87	696.19	23.2	2.4661721	0.99929	2.4644211
B21-1796	LDW21-GT29-GB-0-10.6 ft	600.79	675.86	75.1	TSA-012	180.4	499.5	0.99752	722.04	678.65	23.1	2.3695318		2.3678968
B21-1798	LDW21-GT29-GB-11-21 ft	584.33	685.35	101.0	TSA-017	187.9	499.4	0.99749	749.71	686.04	23.2	2.7049457	0.99929	2.7030252
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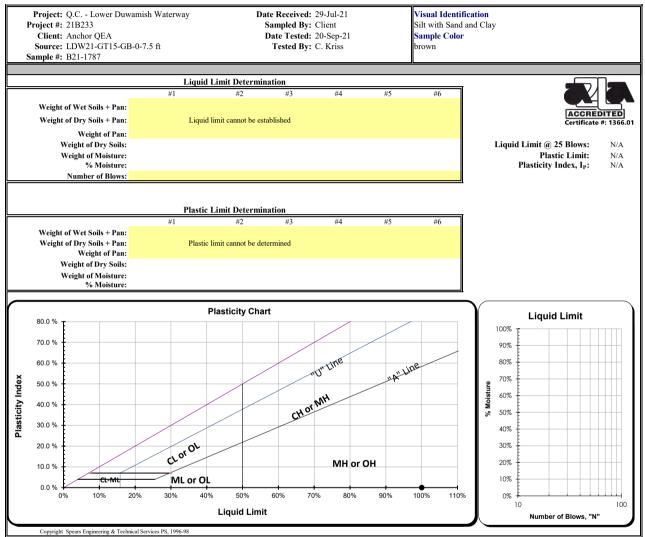
All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:

Meghan Blodgett-Carrillo



ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils



All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our

Comments: Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the liquid limit cup without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT15-GB-7.5-15 ft

Sample#: B21-1789

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 20-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SP, Poorly graded Sand

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Space

Sample Meets Specs? N/A

 $\begin{array}{c} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.076 \\ \textbf{D}_{(10)} = 0.113 \\ \textbf{D}_{(15)} = 0.150 \\ \textbf{D}_{(30)} = 0.220 \\ \textbf{D}_{(50)} = 0.313 \\ \textbf{D}_{(60)} = 0.359 \\ \textbf{D}_{(90)} = 1.522 \\ \textbf{Partice} = 2/31 \\ \textbf{D}_{(40)} = 2/31 \\ \textbf{D$ mm % Gravel = 1.6% % Sand = 93.6% mm % Silt & Clay = 4.8% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a mm

Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 1.19$ Coeff. of Uniformity, $C_U = 3.17$ Fineness Modulus = 1.81 Plastic Limit = n/a

Moisture %, as sampled = 30.4% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

					D	$D_{(90)} = 1.322$ ust Ratio = 2/31	111111	Fracture %, 2+ F			cture %, 2+ F	
				A C'		FM D6913, ASTM	C117	Tracture 70, 2+ 1	aces – II/a	Requiriac	ture 70, 2 1	aces –
		Actual	Interpolated	AS	IM C130, AS	IM D6913, ASTM	CII/					
			Cumulative			ľ		Grain Size Distrib	ution			
Sieve	Cina	Percent	Percent	Encos	Specs	-		¥				
US	Metric			Specs Max	Min		70 18 19 14 18	7. 17. 17. 17. 17. 17. 17. 17. 17. 17. 1	## # # # # # # # # # # # # # # # # # #	88458		
12.00"	300.00	Passing	Passing 100%	100.0%	0.0%	- '	00%		** * * * * * * *			100.0%
10.00"	250.00		100%	100.0%	0.0%				λ			1
8.00"	200.00		100%	100.0%	0.0%		90%					90.0%
6.00"	150.00		100%	100.0%	0.0%		t		1 \			1
4.00"	100.00		100%	100.0%	0.0%		-		1 1 1 1 1			1
3.00"	75.00		100%	100.0%	0.0%		80%		— <u> </u>		-	80.0%
2.50"	63.00		100%	100.0%	0.0%		ļ					1
2.00"	50.00	100%	100%	100.0%	0.0%							1
1.75"		10076	100%	100.0%	0.0%		70%					70.0%
1.75"	45.00 37.50		100%	100.0%	0.0%							1
1.25"	31.50		100%	100.0%	0.0%		60%					60.0%
1.25"	25.00	100%	100%	100.0%	0.0%	II						
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	<u> </u>					isi isi
5/8"	16.00	100%	99%	100.0%	0.0%	₽6 G	50%				-	50.0%
		000/							1 111111111111			1
1/2"	12.50	99%	99%	100.0%	0.0%							1
3/8"	9.50	99%	99%	100.0%	0.0%		40%					40.0%
1/4"	6.30	000/	99%	100.0%	0.0%				1 111111111			1
#4	4.75	98%	98%	100.0%	0.0%		30%		\			30.0%
#8	2.36	0.50/	97%	100.0%	0.0%		50% F					1 00.0%
#10	2.00	97%	97%	100.0%	0.0%		F					1
#16	1.18		85%	100.0%	0.0%		20%					20.0%
#20	0.850		80%	100.0%	0.0%					\		1
#30	0.600		77%	100.0%	0.0%					1		1
#40	0.425	74%	74%	100.0%	0.0%		10%			V		10.0%
#50	0.300		47%	100.0%	0.0%		t			N. III		1
#60	0.250		37%	100.0%	0.0%							0.0%
#80	0.180		21%	100.0%	0.0%		100.000	10.000	1.000	0.100	0.010	0.001
#100	0.150	15%	15%	100.0%	0.0%							
#140	0.106		9%	100.0%	0.0%			Particle Siz	ze (mm)			
#170	0.090		7%	100.0%	0.0%							
#200	0.075	4.8%	4.8%	100.0%	0.0%	+ Si	eve Sizes	─ Max Specs	Min Sp	oecs ——•	Sieve Results	
	Spears Engineering & Tec											
Il results apply only to a	ctual locations and material	ls tested. As a mutual prote	ection to clients, the public	and ourselves, all reports are s	submitted as the confide	ential property of clients, and	authorization for pub	lication of statements, conc	lusions or extracts from o	r regarding our reports	is reserved pending	our written approval.

Reviewed by: Meghan Blodgett-Carrillo

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1789
Sample Date:	7/12/2021
Test Date:	9/28/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT15-GB-7.5-15 ft

 Visual Soil Description:
 brown sand with silt

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

Specimen Height (in): 2.3

Specimen Height (in): 1

Rate of Strain (in/min): 0.0208

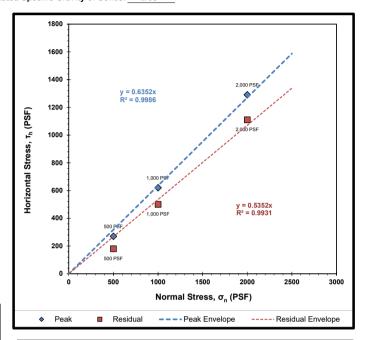
Estimated Specific Gravity of Solids: 2.65

Summary of Sampl	σ _n =500 PSF	
Initial Moisture Content (%):	26.1	
	Initial	Post-Consolidation
Dry Density (PCF):	109.2	110.2
Void Ratio:	0.543	0.528
Porosity (%):	35.2	34.6
Degree of Saturation (%):	saturated	saturated

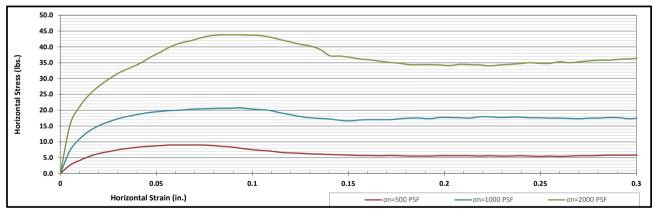
Summary of Samp	le Data:	σ _n =1000 PSF		
Initial Moisture Content (%):	25.9			
	Initial	Post-Consolidation		
Dry Density (PCF):	108.7	110.2		
Void Ratio:	0.550	0.529		
Porosity (%):	35.5	34.6		
Degree of Saturation (%):	saturated	saturated		

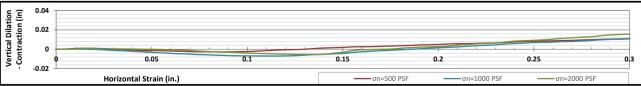
Summary of Sampl	e Data:	σ _n =2000 PSF
Initial Moisture Content (%):	25.9	
	Initial	Post-Consolidation
Dry Density (PCF):	110.0	114.4
Void Ratio:	0.532	0.473
Porosity (%):	34.7	32.1
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS						
	PEAK	RESIDUAL				
Angle of Internal Friction, φ (°):	32	28				
Cohesion (PSF):	0	0				



Failure Envelope Test Values:								
Normal Stress, σ _n (PSF):	500	1000	2000					
Peak Horizontal Stress, τ _h (PSF):	270	620	1290					
Residual Horizontal Stress, τ _h (PSF):	180	500	1110					





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Sample#: B21-1790

Source: LDW21-GT15-GB-15-17.5 ft

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 20-Sep-21 Tested By: C. Kriss

Visual Identification Sandy Silt with Clay Sample Color: brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Casasa

No Specs

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D43} \\ \textbf{D}_{(5)} = 0.004 \\ \textbf{D}_{(10)} = 0.006 \\ \textbf{D}_{(15)} = 0.012 \\ \textbf{D}_{(30)} = 0.039 \\ \textbf{D}_{(50)} = 0.067 \\ \textbf{D}_{(60)} = 0.082 \\ \textbf{D}_{(90)} = 0.193 \\ \end{array}$ mm % Gravel = 1.3% % Sand = 41.6% mm % Silt & Clay = 57.1% mm mm Liquid Limit = n/a mm Plasticity Index = n/amm Sand Equivalent = n/a

Coeff. of Curvature, $C_C = 2.92$ Coeff. of Uniformity, $C_U = 12.63$ Fineness Modulus = 0.29 Plastic Limit = n/a Moisture %, as sampled = 36.7% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face = eq'd Fracture %, 2+ Faces =

						D ₍₆₀₎ - 0.082	111111		Sand Equiva				Ket
					ъ.	$D_{(90)} = 0.193$	mm		acture %, 1				Req'd
						st Ratio = 47/80		Fract	ure %, 2+ F	aces = n/a	à	Keq	q'd Fı
		Actual	Interpolated	AS	STM C136, AST	M D6913, ASTM	I CH7						
			Cumulative			ľ		G	Frain Size Distrib	oution			
C:	Size	Percent	Percent	C	C								
				Specs	Specs			7 8 8 2	3/8".	82 8 8	\$ \$ \$ \$ \$ \$ \$ \$ \$	\$28 288	
US 12.00"	Metric 300.00	Passing	Passing 100%	Max 100.0%	Min 0.0%	1	100%	-******	****		I + + + -	***	TT
10.00"	250.00		100%	100.0%	0.0%						N		
8.00"	200.00		100%	100.0%	0.0%		90%						Ш
6.00"	150.00		100%	100.0%	0.0%		1				111 1		
4.00"	100.00		100%	100.0%	0.0%						11111		
3.00"	75.00		100%		0.0%		80%					₩₩	+-
2.50"	63.00		100%	100.0% 100.0%	0.0%							\	
2.00"	50.00	100%	100%	100.0%	0.0%							1	
		100%					70%				††††	1	++-
1.75"	45.00		100%	100.0%	0.0%							Ŋ.	
1.50"	37.50		100%	100.0%	0.0%		60%					1111	Ш
1.25"	31.50	1000/	100%	100.0%	0.0%	_	00%					ĵ.	П
1.00"	25.00	100%	100%	100.0%	0.0%	Sing	- []					1	
3/4"	19.00	99%	99% 99%	100.0%	0.0%	% Passing	50%						++-
5/8"	16.00	222/		100.0%	0.0%							 	
1/2"	12.50	99%	99%	100.0%	0.0%							*	:
3/8"	9.50	99%	99%	100.0%	0.0%		40%				###		/
1/4"	6.30	222/	99%	100.0%	0.0%								M
#4	4.75	99%	99%	100.0%	0.0%		30%						
#8	2.36	2007	98%	100.0%	0.0%		50,0						11
#10	2.00	98%	98%	100.0%	0.0%								$ \rangle$
#16	1.18		97%	100.0%	0.0%		20%				++-		++-3
#20	0.850		97%	100.0%	0.0%								
#30	0.600		97%	100.0%	0.0%								
#40	0.425	97%	97%	100.0%	0.0%		10%				 		++-
#50	0.300		93%	100.0%	0.0%								
#60	0.250		92%	100.0%	0.0%		0.62					ЩЩ	Ш
#80	0.180		90%	100.0%	0.0%		1	00.000	10.000	1.000	(0.100	
#100	0.150	89%	89%	100.0%	0.0%				D-st. 1 o	ine (nem)			
#140	0.106		70%	100.0%	0.0%				Particle Siz	ze (mm)			
#170	0.090		63%	100.0%	0.0%								
#200	0.075	57.1%	57.1%	100.0%	0.0%	+ 5	lieve Sizes		Max Specs		Min Spec	.5	_

Comments:			
	Mando Classest and Ma		

Meghan Blodgett-Carrillo

Reviewed by:



Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Visual Identification **Project #:** 21B233 Sandy Silt with Clay Sampled By: Client Client: Anchor QEA Date Tested: 20-Sep-21 Sample Color Source: LDW21-GT15-GB-15-17.5 ft Tested By: C. Kriss brown Sample#: B21-1790 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Assumed Sp Gr: Sieve Analysis 2.65 Sample Weight: 75.02 **Grain Size Distribution** Hydroscopic Moist .: 1.96% Percent Soils Particle Sieve ACCREDITED Adj. Sample Wgt: 73.58 Size Passing Diameter 3.0" 100% 75.000 mm 2.0" 100% 50.000 mm Hydrometer Soils Particle 1.5" Reading Corrected Percent 100% 37.500 mm Minutes 1.25" 100% 31.500 mm Reading Passing Diameter 25.000 mm 33.8% 0.0477 mm 25.5 1.0" 100% 2 21 27.8% $0.0347 \ mm$ 3/4" 99% 19.000 mm 22.5% 0.0224 mm 5/8" 99% 16.000 mm 15.9% 0.0133 mm 1/2" 99% 12.500 mm 30 13.3% 0.0096 mm 3/8" 99% 9.500 mm 10 60 10.6% 0.0068 mm 1/4" 99% 6.300 mm 240 4.6% 0.0035 mm 99% 4.750 mm 3.5 #4 2.7% 0.0014 mm #10 98% 2.000 mm 1440 #20 97% 0.850 mm Liquid Limit: n/a 97% % Gravel: 1.3% #40 0.425 mm % Sand: 41.6% Plastic Limit: n/a #100 89% 0.150 mm % Silt: 49.7% Plasticity Index: n/a #200 57.1% 0.075 mm 0.074 mm % Clay: 7.3% Silts 56.2% 42.6% 0.050 mm 0.020 mm 20.8% $0.005\ mm$ Clays 7.3% 3.2% $0.002\ mm$ Colloids 1.8% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: 2.0 - 0.05 mm 0.05 - 0.002 mm % Silt: < 0.002 mm % Clay: **USDA Soil Textural Classification** Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or

Comments:		
Daviewed by	Magh Bhilgott and b	
Reviewed by:	Meghan Blodgett-Carrillo	



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT15-GB-17.5-19 ft

Sample#: B21-1791

#30

#40

#50

#60

#80

#100

#140

#170

#200

0.600

0.425

0.300

0.250

0.180

0.150

0.106

0.090

0.075

68%

15.5%

Meghan Blodgett-Carrillo

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 20-Sep-21 Tested By: C. Kriss Unified Soils Classification System, ASTM D-2487

SM, Silty Sand
Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs ? N/A

 $D_{(5)} = 0.007$ $D_{(10)} = 0.056$ $D_{(15)} = 0.073$ mm % Gravel = 2.2% % Sand = 82.3% mm % Silt & Clay = 15.5% mm $D_{(30)} = 0.142$ mm Liquid Limit = n/a $D_{(50)} = 0.287$ mm Plasticity Index = n/a $D_{(60)} = 0.362$ mm Sand Equivalent = n/a

 $D_{(90)} = 1.662$ mm Fracture %, 1 Face = n/a Sust Ratio = 22/97 Fracture %, 2+ Faces = n/a

Coeff. of Curvature, $C_C = 0.98$ Coeff. of Uniformity, $C_U = 6.42$

Fineness Modulus = 1.71 Plastic Limit = n/a Moisture %, as sampled = 25.3% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

				4.6	TM C136,
		Actual	Interpolated	AS	IM C136,
			e Cumulative		
Sieve	Size	Percent	Percent	Specs	Specs
US	Metric	Passing	Passing	Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	98%	98%	100.0%	0.0%
1/4"	6.30		98%	100.0%	0.0%
#4	4.75	98%	98%	100.0%	0.0%
#8	2.36		96%	100.0%	0.0%
#10	2.00	96%	96%	100.0%	0.0%
#16	1.18		82%	100.0%	0.0%
#20	0.850		76%	100.0%	0.0%

71%

68%

52%

45%

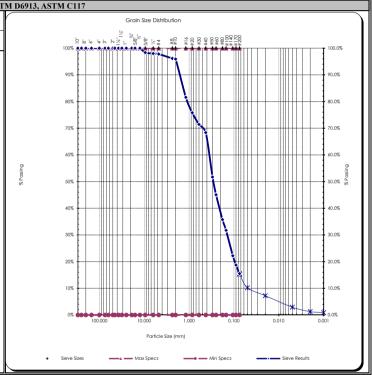
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22%

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15.5%



Il results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

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Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Unified Soils Classification System, ASTM D-2487 Sampled By: Client Project #: 21B233 SM, Silty Sand Client: Anchor QEA Date Tested: 20-Sep-21 Sample Color Source: LDW21-GT15-GB-17.5-19 ft Tested By: C. Kriss brown Sample#: B21-1791 ASTM D7928, HYDROMETER ANALYSIS **ASTM D6913** Assumed Sp Gr: Sieve Analysis 2.65 Sample Weight: 74.97 **Grain Size Distribution** Hydroscopic Moist .: Soils Particle 1.06% Sieve Percent ACCREDITED Adj. Sample Wgt : 74.18 Size Passing Diameter 3.0" 100% 75.000 mm 2.0" 100% 50.000 mm Hydrometer Soils Particle Reading Corrected Percent 1.5" 100% 37.500 mm Minutes Reading 1.25" 100% 31.500 mm Passing Diameter 0.0532 mm 9.1% 1.0" 100% 25.000 mm 3/4" 9.1% 0.0376 mm 100% 19.000 mm 7.8% 0.0239 mm 5/8" 100% 16.000 mm 6.5% 0.0139 mm 1/2" 100% 12.500 mm 30 5.8% 0.0098 mm 3/8" 98% 9.500 mm 4.5 0.0070 mm 60 5.2% 1/4" 98% 6.300 mm 240 0.0035 mm 98% 4.750 mm 1.3% #4 1 3% 0.0014 mm #10 96% 2.000 mm 1440 0.850 mm #20 76% 2.2% Liquid Limit: n/a % Gravel: #40 68% $0.425 \ mm$ % Sand: 82.3% Plastic Limit: n/a #100 32% 0.150 mm % Silt: 12.6% Plasticity Index: n/a #200 15.5% 0.075 mm 15.2% 0.074 mm % Clav: 3.0% Silts 10.2% 0.050 mm 0.020 mm 7.3% 3.0% 0.005 mm Clays 1.3% $0.002\ mm$ Colloids 0.9% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm < 0.002 mm % Clay: **USDA Soil Textural Classification** All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or Comments:

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT15-GB-17.5-25.4 ft

Sample#: B21-1792

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 20-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.023 \\ \textbf{D}_{(10)} = 0.046 \\ \textbf{D}_{(15)} = 0.069 \\ \textbf{D}_{(30)} = 0.125 \\ \textbf{D}_{(50)} = 0.234 \\ \textbf{D}_{(60)} = 0.299 \\ \textbf{D}_{(90)} = 1.927 \\ \textbf{Partice} = 7/34 \end{array}$ mm % Gravel = 8.2% % Sand = 75.4% mm % Silt & Clay = 16.4% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a mm

Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 1.13$ Coeff. of Uniformity, $C_U = 6.52$ Fineness Modulus = 1.71 Plastic Limit = n/a Moisture %, as sampled = 28.3%

Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

					D	ust Ratio =	7/34		Fracture	%, 2+ F	aces =	n/a		Req'd	l Fracti	are %,	2+ Fac	es =
				AS	TM C136, AS	TM D6913,	ASTM C11	7										
			Interpolated						Grain	Size Distrib	ution							
			Cumulative		1	_												
Sieve		Percent	Percent	Specs	Specs		ь	60 Se Se Se		90 :* 4	82 9 E	8 8 9 1	8885	28				
US	Metric	Passing	Passing	Max	Min	4	100%		•	* * * * * * * * * * * * * * * * * * *	-	1	## ###	**	т-т	ппт		T 100.0%
12.00"	300.00		100%	100.0%	0.0%		-		N									1
10.00"	250.00		100%	100.0%	0.0%		1			*****								1
8.00"	200.00		100%	100.0%	0.0%		90%		 		"	###			 - - - - - - - - -	Ш		90.0%
6.00"	150.00		100%	100.0%	0.0%		ŀ				N.							1
4.00"	100.00		100%	100.0%	0.0%		80%					٠						80.0%
3.00"	75.00		100%	100.0%	0.0%		00% F					ll i						1 00.0%
2.50"	63.00		100%	100.0%	0.0%		F					1						1
2.00"	50.00	100%	100%	100.0%	0.0%		70%											70.0%
1.75"	45.00		98%	100.0%	0.0%		1											1
1.50"	37.50		96%	100.0%	0.0%		1											1
1.25"	31.50		94%	100.0%	0.0%		60%		+++-			####			++-	++++		60.0%
1.00"	25.00	92%	92%	100.0%	0.0%	흔	ŀ						\					2
3/4"	19.00	92%	92%	100.0%	0.0%	% Possing	50%						1					50.0% kg
5/8"	16.00		92%	100.0%	0.0%	№	50%						I					50.0% _{be}
1/2"	12.50	92%	92%	100.0%	0.0%		-						1					1
3/8"	9.50	92%	92%	100.0%	0.0%		40%					₩.	1		<u> </u>	ЩЩ.		40.0%
1/4"	6.30		92%	100.0%	0.0%		1						}					1
#4	4.75	92%	92%	100.0%	0.0%		ŀ						\					1
#8	2.36		91%	100.0%	0.0%		30%					####	+++		+ -			30.0%
#10	2.00	91%	91%	100.0%	0.0%		ŀ						1 1					1
#16	1.18		85%	100.0%	0.0%								1					1
#20	0.850		83%	100.0%	0.0%		20%							1.				20.0%
#30	0.600		81%	100.0%	0.0%		- 1							m				1
#40	0.425	80%	80%	100.0%	0.0%		10%						<u> </u>			Ш		10.0%
#50	0.300		60%	100.0%	0.0%		į.											1
#60	0.250		52%	100.0%	0.0%		ŀ											1
#80	0.180		42%	100.0%	0.0%		0%	100.000	debade be d	0.000	1.000	 	0.1	00	11	010		0.0%
#100	0.150	37%	37%	100.0%	0.0%			100.000	11		1.00	U	0.1	00	0.	010		.001
#140	0.106	****	25%	100.0%	0.0%					Particle Si	ze (mm)							
#170	0.090		20%	100.0%	0.0%													
#200	0.075	16.4%	16.4%	100.0%	0.0%		+ Sieve Size	s •	Mo	ıx Specs	_		Min Specs			Sieve F	esults.	
	Spears Engineering & Tec		l															
				and ourselves, all reports are	submitted as the confidence	ential property of cl	ients, and authoriz	ation for publ	ication of state	ements, conc	lusions or e	xtracts fi	rom or rega	arding our	reports is	reserved	pending or	ır written appı

Comments: Reviewed by: Meghan Blodgett-Carrillo



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT15-GB-25.4-27.5 ft

Sample#: B21-1793

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 20-Sep-21 Tested By: C. Kriss

Unified Soils Classification System, ASTM D-2487

SM, Silty Sand Sample Color: brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D43} \\ \textbf{D}_{(5)} = 0.006 \\ \textbf{D}_{(10)} = 0.010 \\ \textbf{D}_{(15)} = 0.022 \\ \textbf{D}_{(30)} = 0.066 \\ \textbf{D}_{(50)} = 0.104 \\ \textbf{D}_{(60)} = 0.125 \\ \textbf{D}_{(90)} = 0.331 \\ \end{array}$ mm % Gravel = 0.0% % Sand = 63.6% mm % Silt & Clay = 36.4% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a Fracture %, 1 Face = n/a mm

Coeff. of Curvature, $C_C = 3.56$ Coeff. of Uniformity, $C_U = 12.70$ Fineness Modulus = 0.42

Plastic Limit = n/a Moisture %, as sampled = 30.2% Req'd Sand Equivalent = Rea'd Fracture %, 1 Face =

						$D_{(90)} - 0.331$	ШШ				rracture 70, 1	
						Oust Ratio = $29/79$		Fracture %, 2+ Faces	s = n/a	Req'd Fr	racture %, 2+	Faces =
				AS	STM C136, AS	TM D6913, ASTM	C117					
		Actual	Interpolated					Grain Size Distribution				
		-	Cumulative		,			F				
	Size	Percent	Percent	Specs	Specs		ъ.	5 45 9% : % 8 44 £	~ 8 8 6 8 8 8 8 8 8 8 8 9 8 9 9 9 9 9 9 9	28		
US	Metric	Passing	Passing	Max	Min	1	00%					T 100.0%
12.00"	300.00		100%	100.0%	0.0%		-		11111			1 1
10.00"	250.00		100%	100.0%	0.0%							1 1
8.00"	200.00		100%	100.0%	0.0%		90%			***********		90.0%
6.00"	150.00		100%	100.0%	0.0%		ĿГ		1			1 1
4.00"	100.00		100%	100.0%	0.0%		80%		1111111111111111111111111111111111111			80.0%
3.00"	75.00		100%	100.0%	0.0%		00% F					1 80.0%
2.50"	63.00		100%	100.0%	0.0%				- IIII			1 1
2.00"	50.00	100%	100%	100.0%	0.0%		70%					70.0%
1.75"	45.00		100%	100.0%	0.0%							1 1
1.50"	37.50		100%	100.0%	0.0%							1 1
1.25"	31.50		100%	100.0%	0.0%		60%					60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	<u>p</u>	- 1					9
3/4"	19.00	100%	100%	100.0%	0.0%	% Possing	[]					50.0%
5/8"	16.00		100%	100.0%	0.0%	96	50%					50.0% %
1/2"	12.50	100%	100%	100.0%	0.0%							1 1
3/8"	9.50	100%	100%	100.0%	0.0%		40%			***************************************		40.0%
1/4"	6.30		100%	100.0%	0.0%					Ĭ		1 1
#4	4.75	100%	100%	100.0%	0.0%					1		1 1
#8	2.36		100%	100.0%	0.0%	;	30%					30.0%
#10	2.00	100%	100%	100.0%	0.0%		- 1					1 1
#16	1.18		100%	100.0%	0.0%		20%					20.0%
#20	0.850		99%	100.0%	0.0%		20%					20.0%
#30	0.600		99%	100.0%	0.0%						k	1 1
#40	0.425	99%	99%	100.0%	0.0%		10%				\perp	10.0%
#50	0.300		87%	100.0%	0.0%						N.J.	1 1
#60	0.250		82%	100.0%	0.0%		11				 	* 1
#80	0.180		75%	100.0%	0.0%		0%	0 0 00 00 00 00 00 00 00 00 00 00 00 00	1.000 0.1	100	0.010	0.0%
#100	0.150	72%	72%	100.0%	0.0%			100.000	1.000 0.1	00	0.010	0.001
#140	0.106		51%	100.0%	0.0%			Particle Size (mr	n)			
#170	0.090		44%	100.0%	0.0%							
#200	0.075	36.4%	36.4%	100.0%	0.0%	+ Sie	eve Sizes	— Max Specs	Min Specs	_	Sieve Results	2

Comments: Reviewed by: Meghan Blodgett-Carrillo



Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Unified Soils Classification System, ASTM D-2487 Sampled By: Client Project #: 21B233 SM, Silty Sand Client: Anchor QEA Date Tested: 20-Sep-21 Sample Color Source: LDW21-GT15-GB-25.4-27.5 ft Tested By: C. Kriss brown Sample#: B21-1793 ASTM D7928, HYDROMETER ANALYSIS **ASTM D6913** Sp Gr: Sieve Analysis 2.46 Sample Weight: 76.16 **Grain Size Distribution** 4.72% Hydroscopic Moist .: Soils Particle Sieve Percent ACCREDITED Adj. Sample Wgt: 72.73 Size Passing Diameter 3.0" 100% 75.000 mm 2.0" 100% 50.000 mm Hydrometer Soils Particle Reading Corrected Percent 1.5" 100% 37.500 mm Minutes 1.25" 100% 31.500 mm Reading Passing Diameter 0.0541 mm 21.7% 1.0" 100% 25.000 mm 15 19.5% 0.0388 mm 3/4" 13.5 100% 19.000 mm 11 15.9% 0.0248 mm 5/8" 100% 16.000 mm 13.0% 0.0145 mm 1/2" 100% 12.500 mm 30 7.5 10.8% 0.0104 mm 3/8" 100% 9.500 mm 0.0074 mm 60 4.5 6.5% 1/4" 100% 6.300 mm 240 0.0038 mm 100% 4.750 mm 3.6% 2.5 #4 2.000 mm 0.0015 mm #10 100% 1440 2.2% 0.850 mm 99% #20 0.0% Liquid Limit: n/a 99% % Gravel: #40 $0.425 \ mm$ % Sand: 63.6% Plastic Limit: n/a #100 72% 0.150 mm % Silt: 31.8% Plasticity Index: n/a #200 36.4% 0.075 mm 35.7% 0.074 mm % Clav: 4.6% Silts 22.4% 0.050 mm 0.020 mm 14.5% 0.005 mm Clays 4.6% 2.5% $0.002\ mm$ Colloids 1.4% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: 2.0 - 0.05 mm 0.05 - 0.002 mm % Silt: < 0.002 mm % Clay: **USDA Soil Textural Classification** Loamy Sand All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or Comments:

Reviewed by:

Materials Testing & Consulting, Inc. Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting



ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Proj C Se	roject: Q.C Lower Duwar ject #: 21B233 Client: Anchor QEA ource: LDW21-GT29-0-10 iple #: B21-1796	•		Date Received: 29-Jul-21 Sampled By: Client Date Tested: 21-Sep-21 Tested By: C. Kriss				cation			
		#1	#2	#3	#4	#5	#6				
•	Weight of Wet Soils + Pan:	32.74	33.79	36.07							
,	Weight of Dry Soils + Pan:	28.61	29.18	30.52							
	Weight of Pan:	19.91	19.73	19.61							
	Weight of Dry Soils:	8.70	9.45	10.91				Liquid Limit @ 25 Blows: 47 %			
	Weight of Moisture:	4.13	4.61	5.55				Plastic Limit: N/A			
	% Moisture:	47.5 %	48.8 %	50.9 %				Plasticity Index, I _P : N/A			
	Number of Blows:	25	16	11							
		Plastie	c Limit Determ	ination #3	#4	#5	#6				
	Weight of Wet Soils + Pan: Weight of Dry Soils + Pan:		limit cannot be de								
	Weight of Pan: Weight of Dry Soils: Weight of Moisture: % Moisture:							ACCREDITED Certificate #: 1366.01, 1366.02 & 1366.04			
	70 % T		Plasticity Cha	art	т			Liquid Limit			
	60 %				:ae			60%			
	50 %			, we	Line	"A"Line		50%			
уфех	40 %			CH	or OH			e 40%			
city II	30 %							an 40%			
ısti	20 %	/ol						20%			
	10 %	CLOOL		М	H or OH						
	CL-ML	ML or C						10%			
	0% 10% 20%	30% 40	% 50%	60% 70	% 80%	90%	100% 110%	0%			
			Liquid Lim	it				10 100 Number of Blows, "N"			
lefoot	Copyright Spears Engineering & Technica	1 Sarvicae DS 1006.09									

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:

Meghan Blodgett-Carrillo

 $Corporate \sim 777\ Chrysler\ Drive \quad \bullet \quad Burlington,\ WA\ 98233 \quad \bullet \quad Phone\ (360)\ 755-1990 \quad \bullet \quad Fax\ (360)\ 755-1980$ **Regional Offices:** Olympia ~ 360.534.9777 Bellingham ~ 360.647.6111 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974

Visit our website: www.mtc-inc.net



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT29-GB-11-21 ft

Sample#: B21-1798

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 20-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SP, Poorly graded Sand

mm

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Cases

No Specs

Sample Meets Specs? N/A

 $\begin{array}{c} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.156 \\ \textbf{D}_{(10)} = 0.197 \\ \textbf{D}_{(15)} = 0.237 \\ \textbf{D}_{(30)} = 0.358 \\ \textbf{D}_{(50)} = 0.737 \\ \textbf{D}_{(60)} = 1.003 \\ \textbf{D}_{(90)} = 1.801 \\ \textbf{Partice} = 3/56 \end{array}$ mm % Gravel = 0.5% % Sand = 97.4% mm % Silt & Clay = 2.0% mm mm Liquid Limit = n/a Plasticity Index = n/amm

Sand Equivalent = n/a Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 0.65$ Coeff. of Uniformity, $C_U = 5.10$ Fineness Modulus = 2.64

Plastic Limit = n/a Moisture %, as sampled = 21.6% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

					D	ust Ratio = $3/$	1	racture %, 2+ Faces =
				AS	TM C136, AS	TM D6913, AS	C117	
		Actual	Interpolated				Grain Size Distribution	
		Cumulative	Cumulative					
Sieve		Percent	Percent	Specs	Specs		10° 10° 10° 10° 10° 10° 10° 10° 10° 10°	
US	Metric	Passing	Passing	Max	Min		126 *** *** *** *** *** *** *** *** *** *	T 100.0%
12.00"	300.00		100%	100.0%	0.0%			
10.00"	250.00		100%	100.0%	0.0%			
8.00"	200.00		100%	100.0%	0.0%		9%	90.0%
6.00"	150.00		100%	100.0%	0.0%			
4.00"	100.00		100%	100.0%	0.0%		DE	80.0%
3.00"	75.00		100%	100.0%	0.0%		5.00	00.0%
2.50"	63.00		100%	100.0%	0.0%			
2.00"	50.00	100%	100%	100.0%	0.0%		0%	70.0%
1.75"	45.00		100%	100.0%	0.0%			
1.50"	37.50		100%	100.0%	0.0%			
1.25"	31.50		100%	100.0%	0.0%		9% 	60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	D L		ju g
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	98	50.0% &
5/8"	16.00		100%	100.0%	0.0%	96	²⁰	30.0% 8
1/2"	12.50	100%	100%	100.0%	0.0%			
3/8"	9.50	100%	100%	100.0%	0.0%		0%	40.0%
1/4"	6.30		100%	100.0%	0.0%			
#4	4.75	99%	99%	100.0%	0.0%			
#8	2.36		98%	100.0%	0.0%		9%	30.0%
#10	2.00	97%	97%	100.0%	0.0%			
#16	1.18		67%	100.0%	0.0%		390	20.0%
#20	0.850		54%	100.0%	0.0%		·°	20.0%
#30	0.600		45%	100.0%	0.0%			
#40	0.425	38%	38%	100.0%	0.0%		0%	10.0%
#50	0.300		23%	100.0%	0.0%			
#60	0.250		17%	100.0%	0.0%			
#80	0.180		8%	100.0%	0.0%		0% de de distribute les difficiences de la la la la la la la la la la la la la	0.010 0.001
#100	0.150	4%	4%	100.0%	0.0%			
#140	0.106		3%	100.0%	0.0%		Particle Size (mm)	
#170	0.090		2%	100.0%	0.0%			
#200	0.075	2.0%	2.0%	100.0%	0.0%	+	ve Sizes — Max Specs — Min Specs —	Sieve Results
Copyright	Spears Engineering & Tec	hnical Services PS, 1996-9	8		1			
aults apply only to a	ctual locations and materials	tested As a mutual prote	ection to clients, the public	and ourselves, all reports are	submitted as the confide	ntial property of clients	thorization for publication of statements, conclusions or extracts from or regarding our rep	vorte is received pending our written appre

Reviewed by: Meghan Blodgett-Carrillo



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT29-GB-21-26 ft

Sample#: B21-1800

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 20-Sep-21 Tested By: C. Kriss

Unified Soil Classification System, ASTM-2487

SP, Poorly graded Sand Sample Color:

gray



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Specs

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{l} \textbf{ASIM D43} \\ \textbf{D}_{(5)} = 0.153 \\ \textbf{D}_{(10)} = 0.185 \\ \textbf{D}_{(15)} = 0.218 \\ \textbf{D}_{(30)} = 0.314 \\ \textbf{D}_{(50)} = 0.527 \\ \textbf{D}_{(60)} = 0.883 \\ \textbf{D}_{(90)} = 1.952 \\ \textbf{Partic} = 3.80 \end{array}$ mm % Gravel = 4.9% % Sand = 93.3% mm % Silt & Clay = 1.8% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a mm

Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 0.60$ Coeff. of Uniformity, $C_U = 4.77$ Fineness Modulus = 2.67

Plastic Limit = n/a Moisture %, as sampled = 18.8% Req'd Sand Equivalent =
Req'd Fracture %, 1 Face =

requiracture 70, 11 acc
Req'd Fracture %, 2+ Faces =

					D	ust Ratio =	3/80		Fractur	e %, 2+								Faces =	:
ASTM C136, ASTM D6913, ASTM C117																			
			Interpolated						Grai	n Size Distri	bution								
		1	Cumulative		1				E+										
Sieve		Percent	Percent	Specs	Specs		<u>o</u>	W 4 6 09	7	. 6 : 4 .	e2 9	888	88888	858 828					
US	Metric	Passing	Passing	Max	Min	4	100%			*	-	1	44 44	 	ПТТ	ттт	TTT	T 100	0.0%
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8.00"	200.00		100%	100.0%	0.0%		90%											90.	J%
6.00"	150.00		100%	100.0%	0.0%		1												
4.00"	100.00		100%	100.0%	0.0%		80%	1 111			$\perp \perp \downarrow \downarrow$	ШШ		ЩЩ	Ш		Ш	80.	0%
3.00"	75.00		100%	100.0%	0.0%		ŀ											1 1	
2.50"	63.00		100%	100.0%	0.0%		ŀ				1 1 1								
2.00"	50.00	100%	100%	100.0%	0.0%		70%				++f		├ ┼─┼─		₩			70.	.0%
1.75"	45.00		100%	100.0%	0.0%		1				I								
1.50"	37.50		100%	100.0%	0.0%		1				11 '	VIII							
1.25"	31.50		100%	100.0%	0.0%		60%					1					+++	60.	
1.00"	25.00	100%	100%	100.0%	0.0%	<u>P</u>	t					N							g.
3/4"	19.00	97%	97%	100.0%	0.0%	% Possing	50%					ШÀ							% Possing
5/8"	16.00		97%	100.0%	0.0%	86	30%					\						T 30.	D/0 %
1/2"	12.50	97%	97%	100.0%	0.0%		F					1							
3/8"	9.50	96%	96%	100.0%	0.0%		40%						₩-					40.	.0%
1/4"	6.30		95%	100.0%	0.0%		1						\						
#4	4.75	95%	95%	100.0%	0.0%		t						\						
#8	2.36		92%	100.0%	0.0%		30%				-		1		++-		+++	30.	0%
#10	2.00	91%	91%	100.0%	0.0%		ŀ						l I I						
#16	1.18		68%	100.0%	0.0%		20%						N					20.	007
#20	0.850		59%	100.0%	0.0%		20% T						i i				Ш	T 20.	J76
#30	0.600		52%	100.0%	0.0%		1						 						
#40	0.425	47%	47%	100.0%	0.0%		10%					-	1		-			10.	.0%
#50	0.300		28%	100.0%	0.0%		1						ľ						
#60	0.250		20%	100.0%	0.0%		ŀ						1	•					
#80	0.180		9%	100.0%	0.0%		0%	100.000	4000000	10.000	- 40 - 0	000 000	-60-60	0.100	111	0.010	111	0.001	%
#100	0.150	5%	5%	100.0%	0.0%			100.000		.0.000	1.0	J00	U			0.010		0.001	
#140	0.106	-	3%	100.0%	0.0%					Particle	Size (mm)								
#170	0.090		2%	100.0%	0.0%														
#200	0.075	1.8%	1.8%	100.0%	0.0%		+ Sieve Size	s	<u></u> ^	tax Specs	_	. .	Min Specs	s		Siev	ve Result		
		hnical Services PS, 1996-9	ļ.		2.070														
				and ourselves, all reports are :	submitted as the confide	ential property of c	lients, and authoriz	ation for pub	lication of sta	tements, cor	clusions or	extracts	from or re	garding o	ur reports	is reserv	ed pend	ing our writt	ten app

Reviewed by:

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1800
Sample Date:	7/14/2021
Test Date:	9/29/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT29-GB-21-26 ft

 Visual Soil Description:
 gray sand

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

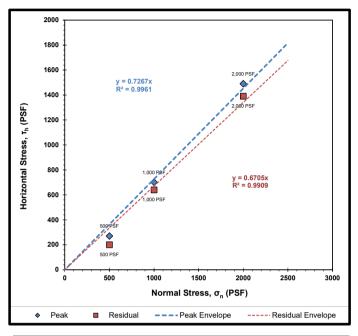
Specimen Height (in): 1
Rate of Strain (in/min): 0.0208
Estimated Specific Gravity of Solids: 2.65

Summary of Sampl	e Data:	σ _n =500 PSF
Initial Moisture Content (%):	23.0	
	Initial	Post-Consolidation
Dry Density (PCF):	107.5	108.1
Void Ratio:	0.567	0.558
Porosity (%):	36.2	35.8
Degree of Saturation (%):	saturated	saturated

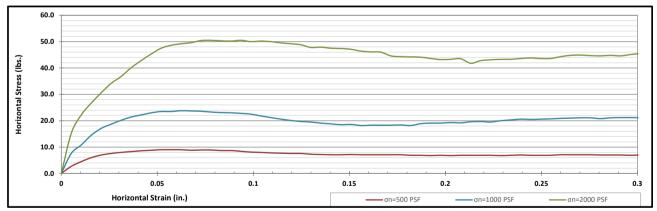
Summary of Samp	le Data:	σ _n =1000 PSF				
Initial Moisture Content (%):	22.3					
	Initial	Post-Consolidation				
Dry Density (PCF):	107.1	108.5				
Void Ratio:	0.572	0.552				
Porosity (%):	36.4	35.6				
Degree of Saturation (%):	saturated	saturated				

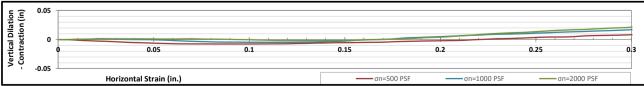
Summary of Sample	e Data:	σ _n =2000 PSF
Initial Moisture Content (%):	21.8	
	Initial	Post-Consolidation
Dry Density (PCF):	108.8	110.9
Void Ratio:	0.548	0.519
Porosity (%):	35.4	34.2
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS										
PEAK RESIDUAL										
Angle of Internal Friction, φ (°):	36	34								
Cohesion (PSF):	0	0								



Failure Envelope Test Values:										
Normal Stress, σ_n (PSF):	500	1000	2000							
Peak Horizontal Stress, τ _h (PSF):	270	700	1490							
Residual Horizontal Stress, τ _h (PSF):	200	640	1390							





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT29-GB-26-28.9 ft

Sample#: B21-1801

Reviewed by:

Meghan Blodgett-Carrillo

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 20-Sep-21 Tested By: C. Kriss

Unified Soils Classification System, ASTM D-2487

SM, Silty Sand Sample Color: brown

ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D43} \\ \textbf{D}_{(5)} = 0.008 \\ \textbf{D}_{(10)} = 0.040 \\ \textbf{D}_{(15)} = 0.061 \\ \textbf{D}_{(30)} = 0.094 \\ \textbf{D}_{(50)} = 0.135 \\ \textbf{D}_{(60)} = 0.167 \\ \textbf{D}_{(90)} = 0.375 \\ \textbf{Ratio} = 15/71 \\ \end{array}$ mm % Gravel = 0.0% % Sand = 79.4% mm % Silt & Clay = 20.6% mm mm Liquid Limit = n/a Plasticity Index = n/a mm Sand Equivalent = n/a mm

Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 1.33$ Coeff. of Uniformity, $C_U = 4.18$ Fineness Modulus = 0.67

Plastic Limit = n/a Moisture %, as sampled = 36.9% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

					Di	ust Ratio = 15/71			Fracture	%, 2+	Faces	= n/a		Re	q'd Fr	racture	e %, 2+	- Faces	s =
	ASTM C136, ASTM D6913, ASTM C117																		
		Actual	Interpolated						Grain	Size Dist	ribution								
		7	Cumulative		1	_			=_										
	Size	Percent	Percent	Specs	Specs		io io	4 to		. 56 : 4	e02 3	2884	3888	8458					
US	Metric	Passing	Passing	Max	Min	10	00%			• And			44	****	TTT	т	TTTTT	тт	100.0%
12.00"	300.00		100%	100.0%	0.0%		- []					Mili	ill					1 1	
10.00"	250.00		100%	100.0%	0.0%	1	[]											1 1	
8.00"	200.00		100%	100.0%	0.0%	1	90%						MT.	1111	m		mm	\Box	90.0%
6.00"	150.00		100%	100.0%	0.0%								N					1 1	
4.00"	100.00		100%	100.0%	0.0%		80%						1	_##	Щ.	1	4444	1	80.0%
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5/8"	16.00		100%	100.0%	0.0%									1				1 1	
1/2"	12.50	100%	100%	100.0%	0.0%										'			1 1	
3/8"	9.50	100%	100%	100.0%	0.0%		40%			-##				1	###		HH	+	40.0%
1/4"	6.30	1000/	100%	100.0%	0.0%									•				1 1	
#4	4.75	100%	100%	100.0%	0.0%		30%							Ш	Ш			⊥i	30.0%
#8	2.36	1000/	100%	100.0%	0.0%	,	1							•				1 1	00.070
#10	2.00	100%	100%	100.0%	0.0%									- 1				1 1	
#16	1.18		99%	100.0%	0.0%		20%						++-		+++-		++++	+	20.0%
#20	0.850		98%	100.0%	0.0%									111				1 1	
#30	0.600	070/	98%	100.0%	0.0%									- 11 /				1 1	
#40	0.425	97%	97%	100.0%	0.0%		10%						M	71117	* + + +	*	m	11	10.0%
#50	0.300		79%	100.0%	0.0%											1	* *	1 1	
#60	0.250		72%	100.0%	0.0%		0%					ШЦ	4		Ш.	للبط	ШТТ	**	0.0%
#80	0.180	500/	62%	100.0%	0.0%			100.000	1	0.000	i	.000		0.100		0.010		0.00)1
#100	0.150	58%	58%	100.0%	0.0%					Particle	e Size (mm)								
#140	0.106		36%	100.0%	0.0%					, arrick	J Jaco (IIIIII)								
#170	0.090	20.69/	28%	100.0%	0.0%														
#200	0.075	20.6%	20.6%	100.0%	0.0%	+ Sie	eve Sizes		M	ax Specs			Min Spe	rCS	_	s	ieve Resul	is.	

Comments:



Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Unified Soils Classification System, ASTM D-2487 Sampled By: Client Project #: 21B233 SM, Silty Sand Client: Anchor QEA Date Tested: 20-Sep-21 Sample Color Source: LDW21-GT29-GB-26-28.9 ft Tested By: C. Kriss brown Sample#: B21-1801 ASTM D7928, HYDROMETER ANALYSIS **ASTM D6913** Assumed Sp Gr: Sieve Analysis 2.65 Sample Weight: 100.10 **Grain Size Distribution** Hydroscopic Moist .: 1.34% Soils Particle Sieve Percent ACCREDITED Adj. Sample Wgt : 98.78 Size Passing Diameter 3.0" 100% 75.000 mm 2.0" 100% 50.000 mm Hydrometer Soils Particle Reading Corrected Percent 1.5" 100% 37.500 mm Minutes 1.25" 100% 31.500 mm Reading Passing Diameter 0.0520 mm 11.5 11.6% 1.0" 100% 25.000 mm 3/4" 2 9.5 9.6% 0.0371 mm 100% 19.000 mm 9 9.1% 0.0235 mm 5/8" 100% 16.000 mm 8.1% 0.0137 mm 1/2" 100% 12.500 mm 30 6.1% 0.0097 mm 3/8" 100% 9.500 mm 6 0.0070 mm 60 4.0% 1/4" 100% 6.300 mm 240 3.5% 0.0035 mm 100% 4.750 mm 3.5 #4 1.5% 0.0014 mm #10 100% 2.000 mm 1440 0.850 mm 98% #20 0.0% Liquid Limit: n/a 97% % Gravel: #40 $0.425 \ mm$ % Sand: 79.4% Plastic Limit: n/a #100 58% 0.150 mm % Silt: 16.8% Plasticity Index: n/a #200 20.6% 0.075 mm 20.2% 0.074 mm % Clav: 3.8% Silts 10.1% 0.050 mm 0.020 mm 8.7% 3.8% 0.005 mm Clays 2.1% $0.002\ mm$ Colloids 1.1% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm < 0.002 mm % Clay: **USDA Soil Textural Classification** All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or Comments:

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT29-GB-28.9-31 ft

Sample#: B21-1802

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 20-Sep-21 Tested By: C. Kriss Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Spece

Sample Meets Specs? N/A

Fracture %, 1 Face = n/a
Fracture %, 2+ Faces = n/a

Coeff. of Curvature, $C_C = 1.57$ Coeff. of Uniformity, $C_U = 5.75$ Fineness Modulus = 0.24

Plastic Limit = n/a Moisture %, as sampled = 37.2% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

						$D_{(90)} = 0.249$	mm		Fractu	ıre %,	1 Fa
					Di	ust Ratio = 2/5		Fr	acture	%, 2+	- Fac
				AS	TM C136, AST	ГМ D6913, ASTM	C117				
		Actual	Interpolated						Grain	Size Dist	tributi
		Cumulative	Cumulative						. Ordin	JIZC DISI	IIIOOII
Sieve	e Size	Percent	Percent	Specs	Specs		b	o 44 9 7 2	- %	· in :	. m
US	Metric	Passing	Passing	Max	Min	_	2 65 ≅ •••••• 3000	6-6'66'68 > 4 9 0 5	. = 3	કે ≥ કે જે જેવ	
12.00"	300.00		100%	100.0%	0.0%						
10.00"	250.00		100%	100.0%	0.0%						
8.00"	200.00		100%	100.0%	0.0%		90%		++-		++-
6.00"	150.00		100%	100.0%	0.0%		- 1				
4.00"	100.00		100%	100.0%	0.0%		80%				
3.00"	75.00		100%	100.0%	0.0%		80%				П
2.50"	63.00		100%	100.0%	0.0%						
2.00"	50.00	100%	100%	100.0%	0.0%		70%			4444	₩.
1.75"	45.00		100%	100.0%	0.0%						
1.50"	37.50		100%	100.0%	0.0%						
1.25"	31.50		100%	100.0%	0.0%		60%		+		++-
1.00"	25.00	100%	100%	100.0%	0.0%	D E	H				
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	50%				
5/8"	16.00		100%	100.0%	0.0%	98	30%			TITT	П
1/2"	12.50	100%	100%	100.0%	0.0%						
3/8"	9.50	100%	100%	100.0%	0.0%		40%			-###	₩-
1/4"	6.30		100%	100.0%	0.0%						
#4	4.75	100%	100%	100.0%	0.0%						
#8	2.36		100%	100.0%	0.0%		30%			-11111	++-
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#20	0.850		99%	100.0%	0.0%		20,0				
#30	0.600		99%	100.0%	0.0%		F				
#40	0.425	99%	99%	100.0%	0.0%		10%				+-
#50	0.300		93%	100.0%	0.0%						
#60	0.250		90%	100.0%	0.0%						
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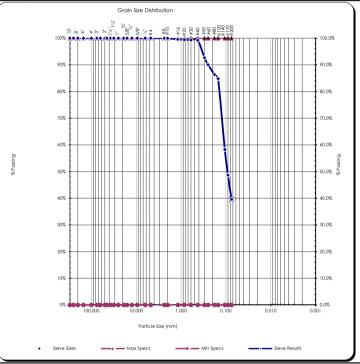
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Comments:			
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Meghan Blodgett-Carrillo

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Reviewed by:



Client: Anchor QEA Date: October 14, 2021	
Address: 21328 2nd Drive SE Project: Q.C Lower Duwamish Wa	iterway
Bothell, WA 98021 Project #: 21B233	
Attn: Garrett Timm Sample #: B21-1812 - 1832	
Revised on: Date sampled: July 15, 2021	

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	Please See Attached Reports		Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count			LA Abrasion	
X	Moisture Content	Please See Attached Report	X	Direct Shear	Please See Attached Reports
	Specific Gravity, Coarse		X	Specific Gravity, Soils	Please See Attached Reports
	Specific Gravity, Fine				
X	Hydrometer Analysis	Please See Attached Reports			
X	Atterberg Limits	Please See Attached Reports			

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted, Meghan Blodgett-Carrillo

WABO Supervising Laboratory Technician



Moisture Content - ASTM C566, ASTM D2216

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: September 23, 2021	Tested by: A. Eifrig

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B21-1812	LDW21-GT25-GB-0-1.5 ft	233.7	903.3	628.8	274.5	395.1	69.5%
B21-1813	LDW21-GT25-GB-0-8.5 ft	260.6	578.9	450.1	128.8	189.5	68.0%
B21-1814	LDW21-GT25-GB-8.5-10 ft	306.5	1244.3	1034.1	210.2	727.6	28.9%
B21-1815	LDW21-GT25-GB-8.5-16.2 ft	234.4	975.8	829.1	146.7	594.7	24.7%
B21-1816	LDW21-GT25-GB-16.2-18.5 ft	301.0	1029.3	834.6	194.7	533.6	36.5%
B21-1817	LDW21-GT25-GB-18.5-20 ft	311.0	1016.3	872.1	144.2	561.1	25.7%
B21-1818	LDW21-GT25-GB-18.5-24.4 ft	182.5	963.7	746.1	217.6	563.6	38.6%
B21-1819	LDW21-GT25-GB-24.4-26ft	268.9	846.8	702.0	144.8	433.1	33.4%
B21-1820	LDW21-GT25-GB-26-28.5 ft	229.0	653.6	545.0	108.6	316.0	34.4%
B21-1821	LDW21-GT25-GB-28.5-30 ft	221.8	847.9	689.3	158.6	467.5	33.9%
B21-1822	LDW21-GT33-GB-0-1.5 ft	223.1	962.3	671.6	290.7	448.5	64.8%
B21-1823	LDW21-GT33-GB-0-10.4 ft	225.2	643.8	515.2	128.6	290.0	44.3%
B21-1824	LDW21-GT33-GB-11-12.5 ft	221.3	1042.8	776.6	266.2	555.3	47.9%
B21-1825	LDW21-GT33-GB-11-18.5 ft	225.3	614.1	543.5	70.6	318.2	22.2%
B21-1826	LDW21-GT33-GB-18.3-21 ft	215.8	753.3	613.6	139.7	397.8	35.1%
B21-1827	LDW21-GT33-GB-21-22.5 ft	220.8	673.2	554.6	118.6	333.8	35.5%
B21-1828	LDW21-GT33-GB-21-26.8 ft	217.3	766.4	626.0	140.4	408.7	34.4%
B21-1829	LDW21-GT33-GB-26.8-28.8 ft	233.1	799.7	630.2	169.5	397.1	42.7%
B21-1830	LDW21-GT33-GB-28.8-29.5 ft	223.1	1026.1	824.1	202.0	601.0	33.6%
B21-1831	LDW21-GT33-GB-29.5-31 ft	221.8	989.1	767.9	221.2	546.1	40.5%
B21-1832	LDW21-GT33-GB-31-32.5 ft	208.9	577.5	479.9	97.6	271.0	36.0%
		Ī		1			
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All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is

Reviewed by:



Moisture Content - ASTM D854

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: September 20, 2021	Tested by: A. Eifrig

Sample #	Location	Tare	Tare	Mass of Dry Soil	Pycno ID		Volume of Pycno	Water @ Tx		Pycno filled w/ water	Water, 0.1 *C	SpG of Soils	Factor	Corrected SpG
B21-1813	LDW21-GT25-GB-0-8.5 ft	498.19	565.01	66.8	TSA-022	198.0	499.5	0.99759	737.17	696.24		2.5812856		2.5796852
B21-1820	LDW21-GT25-GB-26-28.5 ft	510.35	585.58	75.2	TSA-015	187.6	499.5	0.99780	732.43	686.00	21.9	2.612047		2.6109761
B21-1825	LDW21-GT33-GB-11-18.5 ft	502.55	602.33	99.8	TSA-023	163.9	498.7	0.99786	723.74	661.59	21.6	2.6514178	0.99966	2.6505163
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All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:

Meghan Blodgett-Carrillo

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ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C Lower Duwamis	sh Waterway		te Received: 29-		Visual Identi	
Project #: 21B233 Client: Anchor QEA, LLC		Sampled By: Cli Date Tested: 25-		Silt with Clay Sample Color		
Source: LDW21-GT25-GB-0-8	3.5 ft		Tested By: K.		brown	•
Sample #: B21-1813						
	Liquid L #1	imit Determina #2	#3	#4	#5 #6	Ţ
Weight of Wet Soils + Pan:	29.60	25.42	26.01	#4	#3 #6	
Weight of Dry Soils + Pan:	25.96	21.62	21.93			
Weight of Pan:	19.65	15.20	15.00			
Weight of Dry Soils:	6.31	6.42	6.93			Liquid Limit @ 25 Blows: 58 %
Weight of Moisture:	3.64	3.80	4.08			Plastic Limit: 45 %
% Moisture: Number of Blows:	57.7 % 28	59.2 % 22	58.9 % 17			Plasticity Index, I _P : 13 %
rumber of biows.	20	LL	17			Į.
		imit Determina				Ţ
Weight of Wet Soils + Pan:	#1 35.15	#2 34.29	#3	#4	#5 #6	
Weight of Dry Soils + Pan:	33.00	32.39				
Weight of Pan:	28.27	28.20				
Weight of Dry Soils:	4.73	4.19				ACCREDITED
Weight of Moisture: % Moisture:	2.15 45.5 %	1.90 45.4 %				Cortificate #: 1366.01, 1366.02 & 1366.04
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						
70 % 🖚	Pla	asticity Chart	_	_		Liquid Limit
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60 %			Writ	THE .	Line	60%
50 %			TO .	نهد لا۔	بالمنتلك	30%
			01	01.		50%
40 %			CH or			40%
30 % 40 % 40 % 40 % 40 % 40 % 40 % 40 %						9.11 150 W 2007
			1			30%
20 %	CLOOL	$\overline{}$	NALL	ОП		20%
	/ U /		IVIH	or OH		
10 %						
10 % CL-ML						10%
CL-ML	ML or OL	50%	709/	909/ 000/	/ 1009/ 1109/	
CL-ML	ML or OL 30% 40%	50% 6	70%	80% 90%	6 100% 110%	10% 0% 100 100 Number of Blows, "N"

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT25-GB-8.5-16.2 ft

Sample#: B21-1815

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 25-Sep-21 Tested By: K. Mendez Unified Soil Classification System, ASTM-2487

SP, Poorly graded Sand

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.216 \\ \textbf{D}_{(10)} = 0.395 \\ \textbf{D}_{(15)} = 0.501 \\ \textbf{D}_{(30)} = 0.773 \\ \textbf{D}_{(50)} = 1.137 \\ \textbf{D}_{(60)} = 1.318 \\ \textbf{D}_{(90)} = 1.864 \\ \textbf{Partice} = 17/07 \end{array}$ mm % Gravel = 1.1% % Sand = 97.0% mm % Silt & Clay = 1.9% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a

Plastic Limit = n/a Moisture %, as sampled = 24.7% Req'd Sand Equivalent =

mm Fracture %, 1 Face = n/a

r	equiriaciure 76, i race –
Rec	'd Fracture %, 2+ Faces =

Coeff. of Curvature, $C_C = 1.15$ Coeff. of Uniformity, $C_U = 3.34$

Fineness Modulus = 3.20

					D	Oust Ratio = 17/	97		Fract	ure %,	2+ Fa	ces = 1	ı/a		Req'o	Fract	ure %	, 2+ F	aces =
				AS	TM C136, AS	TM D6913, AS	TM C117												
			Interpolated						G	rain Size	Distribut	ion							
			Cumulative		1														
Sieve		Percent	Percent	Specs	Specs		b :	. φ. 4. β.	2.50	. of ~og	. 1 #	2 28	8 8 8	8888	28				
US	Metric	Passing	Passing	Max	Min	4	100%		• (• • • •		201		# # #	# # # # # # # # # # # # # # # # # # #	**	т т —	ппт	ттт	T 100.0%
12.00"	300.00		100%	100.0%	0.0%							1 II							-1
10.00"	250.00		100%	100.0%	0.0%														- 1
8.00"	200.00		100%	100.0%	0.0%		90%				###	1	m		mm	++-	11111		90.0%
6.00"	150.00		100%	100.0%	0.0%		1												1
4.00"	100.00		100%	100.0%	0.0%		80%												80.0%
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2.50"	63.00		100%	100.0%	0.0%														- 1
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1.75"	45.00		100%	100.0%	0.0%														1
1.50"	37.50		100%	100.0%	0.0%		į.					1 1 11							1
1.25"	31.50		100%	100.0%	0.0%		60%				-	++++	₩		₩₩	++-		++-+	60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	2	ł												p p
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	50%												50.0% %
5/8"	16.00		100%	100.0%	0.0%	P6	50%												50.0% _{be}
1/2"	12.50	100%	100%	100.0%	0.0%		- 1												- 1
3/8"	9.50	100%	100%	100.0%	0.0%		40%		Щ.				Ш.		ШШ	Ш.	4444		40.0%
1/4"	6.30		99%	100.0%	0.0%		1					1							1
#4	4.75	99%	99%	100.0%	0.0%		ŀ					ì							1
#8	2.36		98%	100.0%	0.0%		30%				-	+	-		₩₩	++-		+++	30.0%
#10	2.00	97%	97%	100.0%	0.0%		· ·						\						- 1
#16	1.18		52%	100.0%	0.0%								N.						1
#20	0.850		34%	100.0%	0.0%		20%						Ň		mm	TT			20.0%
#30	0.600		20%	100.0%	0.0%		1						1						1
#40	0.425	11%	11%	100.0%	0.0%		10%					1	Щ		ШШ		ЩЦ		10.0%
#50	0.300		7%	100.0%	0.0%								\						1
#60	0.250		6%	100.0%	0.0%		ł								Ш				1
#80	0.180		4%	100.0%	0.0%		0%	100,000	debbe	10.000	والماطاة	1.000	-	00 00 0	لللوس	11	шш	111	0.0%
#100	0.150	3%	3%	100.0%	0.0%			100.000		10.000		1.000		0.1	UU	C	.010		0.001
#140	0.106	570	2%	100.0%	0.0%					Par	rticle Size	(mm)							
#170	0.090		2%	100.0%	0.0%														
#200	0.075	1.9%	1.9%	100.0%	0.0%	1	Sieve Sizes			- Max Spe	ecs .	_	^	nin Specs			- Sieve	Results	
	Spears Engineering & Tec		1	100.070	0.070		2.270 01203		-				"				21010		
17 0	1 0 0			and ourselves, all reports are	submitted as the confid-	lential property of clients	and authorizat	ion for pul	blication o	statement	s conclus	ions or ex	tracts fr	om or regs	arding our	renorts is	reserve	l pendino	our written ann

Comments:

Meghan Blodgett-Carrillo

Reviewed by:

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1815
Sample Date:	7/15/2021
Test Date:	9/30/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT25-GB-8.5-16.2 ft

 Visual Soil Description:
 brown sand with silt

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

Specimen Height (in): 2.3

Specimen Height (in): 1

Rate of Strain (in/min): 0.0208

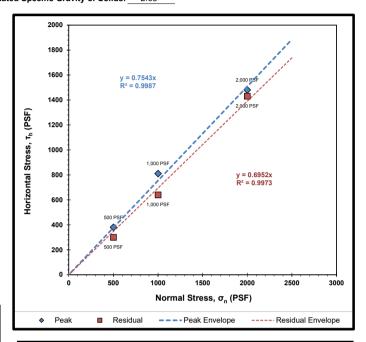
Estimated Specific Gravity of Solids: 2.65

Summary of Sampl	e Data:	σ _n =500 PSF
Initial Moisture Content (%):	25.1	
	Initial	Post-Consolidation
Dry Density (PCF):	108.7	109.7
Void Ratio:	0.550	0.536
Porosity (%):	35.5	34.9
Degree of Saturation (%):	saturated	saturated

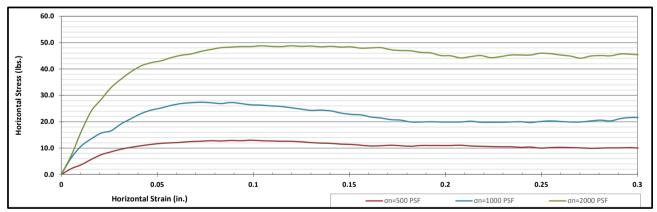
Summary of Samp	le Data:	σ _n =1000 PSF			
Initial Moisture Content (%):	24.7				
	Initial	Post-Consolidation			
Dry Density (PCF):	107.3	108.8			
Void Ratio:	0.571	0.549			
Porosity (%):	36.3	35.4			
Degree of Saturation (%):	saturated	saturated			

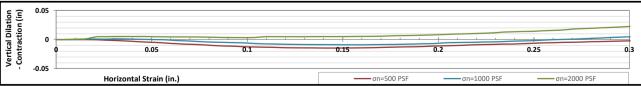
Summary of Sample	e Data:	σ _n =2000 PSF
Initial Moisture Content (%):	25.6	
	Initial	Post-Consolidation
Dry Density (PCF):	107.7	110.3
Void Ratio:	0.564	0.527
Porosity (%):	36.0	34.5
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS								
	PEAK	RESIDUAL						
Angle of Internal Friction, φ (°):	37	35						
Cohesion (PSF):	0	0						



Failure Envelope Test Values:									
Normal Stress, σ _n (PSF):	500	1000	2000						
Peak Horizontal Stress, τ _h (PSF):	380	810	1480						
Residual Horizontal Stress, τ _h (PSF):	300	640	1430						





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ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project #: 21B233 Client: Anchor QEA, LI Source: LDW21-GT25-C Sample #: B21-1816		Date Received: 29-Jul-21 Sampled By: Client Date Tested: 25-Sep-2 Tested By: K. Mende	1	Visual Identifica Sand Sample Color grayish-brown	
	Liquid Liggis Dete	umination			
	Liquid Limit Dete	rmination #3 #4	#5	#6	
Weight of Wet Soils + Pan					
Weight of Dry Soils + Pan		h liquid limit			
Weight of Pan					
Weight of Dry Soils					Liquid Limit @ 25 Blows: N/A
Weight of Moisture % Moisture					Plastic Limit: N/A Plasticity Index, I _P : N/A
Number of Blows					i monerey index, ip. 197A
Weight of Wet Soils + Pan Weight of Dry Soils + Pan Weight of Pan Weight of Dry Soils Weight of Moisture % Moisture	: Cannot determine	d plastic limit			ACCREDITED Cortificato #: 1346.01, 1346.02 & 1386.04
70 % 🕶	Plasticity C	hart			Liquid Limit
60 %		CH or OH	William .		100% 90% 80% 70%
40 %		CHO			oisture 60%
30 %					× 50% + + + + + + + + + + + + + + + + + + +
20 %	CLorOL	MH or O	Н		30%
10 %		ivin or O			20%
0 % CL-ML	ML or OL				10%
0% 10%	20% 30% 40% 50%	60% 70% 80%	90% 1	00% 110%	0%
	Liquid Li	mit		J	Number of Blows, "N"

Liquid limit cannot be established as the material displays rapid dilation. At lower moistures the material does not spread into the liquid limit device without

tearing the soil cake. Plastic limit cannot be determined as the sample does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by: Meghan Blodgett-Carrillo

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ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

P	Project: Q.C Lower Duw roject #: 21B233 Client: Anchor QEA, LLC Source: LDW21-GT25-GE ample #: B21-1818		S D	e Received: ampled By: ate Tested: Tested By:	Client 25-Sep-21		Visual Identific Sand Sample Color grayish-brown	cation
		Liquid I	imit Determinat	ion				
		#1	#2	#3	#4	#5	#6	
	Weight of Wet Soils + Pan:							
	Weight of Dry Soils + Pan:	Unab	le to esablish liquid	limit				
	Weight of Pan:							
	Weight of Dry Soils: Weight of Moisture:							Liquid Limit @ 25 Blows: N/A Plastic Limit: N/A
	% Moisture:							Plasticity Index, I _P : N/A
	Number of Blows:							-
		Plastic I	imit Determinat	tion #3	#4	#5	#6	
	Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Weight of Pan: Weight of Dry Soils:		#2 t determined plastic		#4	#3	#6	
	Weight of Moisture: % Moisture:							Cortificate #: 1366.01, 1366.02 & 1366.04
	70 % 🕶	Pl	asticity Chart					Liquid Limit
	60 %				tine	"Line-		90%
×	50 %				or OH	WA!" LA		80%
Plasticity Index	40 %			ch				woisum 60%
tici	30 %							% 40% -
Plas	20 %	CLorOL		NA	H or OH			30%
	10 %	ML or OL		171				20%
	0%	20% 30% 40%	50% 6	0% 70%	80%	90% 10	00% 110%	10%
l	•		Liquid Limit					10 100 Number of Blows, "N"
)	Copyright Spears Engineering & Techn	nical Services PS, 1996-98						

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Liquid limit cannot be established as the material displays rapid dilation. At lower moistures the material does not spread into the liquid limit device without tearing the soil cake. Plastic limit cannot be determined as the sample does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by: Meghan Blodgett-Carrillo

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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT25-GB-26-28.5 ft **Sample#:** B21-1820

Source: LDW21-GT25-GB-26-28.5 ft

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 25-Sep-21 Tested By: K. Mendez Visual Identification Sandy Silt with Clay Sample Color: brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Specs

Sample Meets Specs ? N/A

Coeff. of Curvature, $C_C = 3.28$ Coeff. of Uniformity, $C_U = 9.69$ Fineness Modulus = 0.16 Plastic Limit = n/aMoisture %, as sampled = 34.2%Req'd Sand Equivalent =

 167
 mm
 Fracture %, 1 Face = n/a
 Req'd Fracture %, 1 Face =

 1/18
 Fracture %, 2+ Faces = n/a
 Req'd Fracture %, 2+ Faces =

					D	ust Ratio = 11/18	Fracture %, 2+ Faces = n/a	Req'd Fracture %, 2+ Faces =
				AS	TM C136, AS	TM D6913, ASTM C117		
			Interpolated				Grain Size Distribution	
		Cumulative						
Sieve		Percent	Percent	Specs	Specs	ò in in i	2.7. 1.1.7. 1.1.7. 1.1.7. 1.1.7. 1.1.7. 1.1.6.	82458
US	Metric	Passing	Passing	Max	Min	100%	************************************	# # # # # 100.0%
12.00"	300.00		100%	100.0%	0.0%			
10.00"	250.00		100%	100.0%	0.0%			
8.00"	200.00		100%	100.0%	0.0%	90%		90.0%
6.00"	150.00		100%	100.0%	0.0%			1
4.00"	100.00		100%	100.0%	0.0%	80%		80.0%
3.00"	75.00		100%	100.0%	0.0%	00%		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
2.50"	63.00		100%	100.0%	0.0%			<u> </u>
2.00"	50.00	100%	100%	100.0%	0.0%	70%		70.0%
1.75"	45.00		100%	100.0%	0.0%			
1.50"	37.50		100%	100.0%	0.0%			N.
1.25"	31.50		100%	100.0%	0.0%	60%		60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	ĝ.		
3/4"	19.00	100%	100%	100.0%	0.0%	Du SSS SO% SSS S		50.0% %
5/8"	16.00		100%	100.0%	0.0%	be 30%		30.0% %
1/2"	12.50	100%	100%	100.0%	0.0%	I		
3/8"	9.50	100%	100%	100.0%	0.0%	40%		40.0%
1/4"	6.30		100%	100.0%	0.0%			
#4	4.75	100%	100%	100.0%	0.0%			
#8	2.36		100%	100.0%	0.0%	30%		30.0%
#10	2.00	100%	100%	100.0%	0.0%	l ti		
#16	1.18		100%	100.0%	0.0%	20%		20.0%
#20	0.850		100%	100.0%	0.0%	20%		
#30	0.600		100%	100.0%	0.0%	I		
#40	0.425	100%	100%	100.0%	0.0%	10%		10.0%
#50	0.300		95%	100.0%	0.0%			
#60	0.250		93%	100.0%	0.0%			
#80	0.180		90%	100.0%	0.0%	0%	.000 10.000 1.000	0.100 0.010 0.001
#100	0.150	89%	89%	100.0%	0.0%			
#140	0.106		73%	100.0%	0.0%		Particle Size (mm)	
#170	0.090		67%	100.0%	0.0%			
#200	0.075	60.9%	60.9%	100.0%	0.0%	Sieve Sizes	—▲ — Max Specs — • — Min S	Specs Sieve Results
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Comments:

Olanda Blakkask ikin Ma

Meghan Blodgett-Carrillo

Reviewed by:



Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Visual Identification Sandy Silt with Clay **Project #:** 21B233 Sampled By: Client Client: Anchor QEA Date Tested: 25-Sep-21 Sample Color Source: LDW21-GT25-GB-26-28.5 ft Tested By: K. Mendez brown Sample#: B21-1820 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Sp Gr: Sieve Analysis 2.61 Sample Weight: 75.00 **Grain Size Distribution** Hydroscopic Moist .: 10.50% Soils Particle Sieve Percent ACCREDITED Adj. Sample Wgt: 67.87 Size Passing Diameter 3.0" 100% 75.000 mm 2.0" 100% 50.000 mm Hydrometer Soils Particle 1.5" Reading Corrected Percent 100% 37.500 mm Minutes 1.25" 100% 31.500 mm Reading Passing Diameter 25.000 mm 32.7% 0.0494 mm 22 1.0" 100% 18 26.8% $0.0357 \ mm$ 3/4" 100% 19.000 mm 15.5 23.0% 0.0230 mm 5/8" 100% 16.000 mm 15.6% 0.0137 mm 1/2" 100% 12.500 mm 30 13.4% 0.0097 mm 3/8" 100% 9.500 mm 0.0070 mm 60 8.9% 1/4" 100% 6.300 mm 240 5.2% 0.0036 mm 100% 4.750 mm 3.5 #4 #10 0.0015 mm 100% 2.000 mm 1440 3.0% #20 100% 0.850 mm 0.0% Liquid Limit: n/a % Gravel: #40 100% 0.425 mm % Sand: 39.1% Plastic Limit: n/a #100 89% 0.150 mm % Silt: 54.1% Plasticity Index: n/a #200 60.9% 0.075 mm 0.074 mm % Clay: 6.8% Silts 59.8% 42.9% 0.050 mm 0.020 mm 20.6% 0.005 mm Clays 6.8% 3.5% $0.002 \ mm$ Colloids 2.0% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: 2.0 - 0.05 mm 0.05 - 0.002 mm % Silt: < 0.002 mm % Clay: **USDA Soil Textural Classification** Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval. **Comments:**

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Reviewed by:

Materials Testing & Consulting, Inc. Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting



ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C Lower Duwam Project #: 21B233 Client: Anchor QEA, LLC Source: LDW21-GT33-GB-0 Sample #: B21-1823	·		te Received: 2 Sampled By: 0 Date Tested: 2 Tested By: F	Client 5-Sep-21		Visual Identific Silt with Clay Sample Color brown	cation
	Liquid L	imit Determina	ntion				
	#1	#2	#3	#4	#5	#6	
Weight of Wet Soils + Pan:	28.38	32.44	32.76				
Weight of Dry Soils + Pan:	24.50	28.64	28.74				
Weight of Pan:	15.01	19.79	19.63				
Weight of Dry Soils:	9.49	8.85	9.11				Liquid Limit @ 25 Blows: 42 %
Weight of Moisture:	3.88	3.80	4.02				Plastic Limit: 32 %
% Moisture:	40.9 %	42.9 %	44.1 %				Plasticity Index, I _P : 10 %
Number of Blows:	32	21	15				
	Plastic L	imit Determina	#3	#4	#5	#6	
Weight of Wet Soils + Pan:	35.43	35.12	#3	#4	#3	#6	
Weight of Dry Soils + Pan:	33.78	33.45					
Weight of Pan:	28.65	28.27					
Weight of Dry Soils:	5.13	5.18					ACCREDITED
Weight of Moisture:	1.65	1.67					Certificate #: 1366.01, 1366.02 & 1366.04
% Moisture:	32.2 %	32.2 %					
70 % T	Pla	asticity Chart					Liquid Limit
60 %				ine			50%
50 %			n Ut	tine	"Line		
50 %				OH	MAX TO		40%
8		/ /	CHY	31			2 35%
9u 40 %							ant 30%
30 % E							25%
70 % Plasticity Index							20%
20 %	CL or OL		NΛL	l or OH			15%
10 %	/ W		IVIE	1 or Un			10%
CL-ML	ML or OL						5%
0%						 	
0% 10% 20%		50% Liquid Limit	60% 70%	80%	90% 1	00% 110%	0% 10 100
		Liquia Limit					Number of Blows, "N"
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All results apply only to actual locations and material our reports is reserved pending our written approval.

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT33-GB-11-18.5 ft

Sample#: B21-1825

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 25-Sep-21 Tested By: K. Mendez Unified Soil Classification System, ASTM-2487

SP, Poorly graded Sand

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Space

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{c} \textbf{2419, ASIM D431} \\ D_{(5)} = 0.128 \\ D_{(10)} = 0.189 \\ D_{(15)} = 0.234 \\ D_{(30)} = 0.368 \\ D_{(50)} = 0.772 \\ D_{(60)} = 1.025 \\ D_{(90)} = 1.786 \\ \\ \textbf{Dust Ratio} = 5/54 \\ \end{array}$ mm % Gravel = 0.1% % Sand = 96.5% mm % Silt & Clay = 3.4% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a

Coeff. of Curvature, $C_C = 0.70$ Coeff. of Uniformity, $C_U = 5.43$ Fineness Modulus = 2.64 Plastic Limit = n/a Moisture %, as sampled = 22.2% Req'd Sand Equivalent =

						$D_{(60)} = 1.025$ $D_{(90)} = 1.786$	mr			nd Equiv ture %, 1					eq'd Sa 'd Fract			
					D	$D_{(90)} = 1.780$ rust Ratio = 5/54	mr	11		e %, 2+					u Fractur			
				AS		TM D6913, ASTM	C112	7	Fractur	e 70, ZT	races	- II/a		Requ	rractur	e 70, Z	- race	s –
		Actual	Interpolated	AS	1 M C130, AS	1M D6913, AS1M	CIL	/										
			Cumulative			ľ			Gra	in Size Distri	bution							
Sieve	Cizo	Percent	Percent	Specs	Specs				Š .									
US	Metric	Passing	Passing	Max	Min		į g	90 go g4 g	7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3/8.74	∞ <u>°</u> ##	# # 29 # # 49	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8					
12.00"	300.00	1 assing	100%	100.0%	0.0%	1	00%	**-			***	* * * *	****	•		ШПП	1	100.0%
10.00"	250.00		100%	100.0%	0.0%		-											
8.00"	200.00		100%	100.0%	0.0%		90%											90.0%
6.00"	150.00		100%	100.0%	0.0%		ŀ										1 1	
4.00"	100.00		100%	100.0%	0.0%		-										1 1	
3.00"	75.00		100%	100.0%	0.0%		30%				+++					\blacksquare		80.0%
2.50"	63.00		100%	100.0%	0.0%						111						1	
2.00"	50.00	100%	100%	100.0%	0.0%		-										- 1	
1.75"	45.00	10076	100%	100.0%	0.0%		70%					H				HHH	1	70.0%
1.75"	45.00 37.50		100%	100.0%	0.0%		-					1						
1.25"	31.50		100%	100.0%	0.0%		50% L					M						60.0%
		100%					ŀ					VIIII					1 1	
1.00" 3/4"	25.00 19.00	100%	100% 100%	100.0% 100.0%	0.0% 0.0%	ui sa	-					N. I					1	isi O
-		100%				% Possing	50%	-			+-				-	\cdots		· 50.0% 🐰
5/8"	16.00	1000/	100%	100.0%	0.0%		-					1					- 1	
1/2"	12.50	100%	100%	100.0%	0.0%		-					l l					- 1	
3/8"	9.50	100%	100%	100.0%	0.0%		40%				11	X				HHH	1	40.0%
1/4"	6.30	1000/	100%	100.0%	0.0%		-					1					- 1	
#4	4.75	100%	100%	100.0%	0.0%		30%										<u> </u>	30.0%
#8	2.36	000/	99%	100.0%	0.0%		-						\				1	00.070
#10	2.00	98%	98%	100.0%	0.0%		F						I I				1 1	
#16	1.18		66%	100.0%	0.0%		20%	+-+	HHHH		+		1-	HHHH		HHH		20.0%
#20	0.850		53%	100.0%	0.0%		-						1					
#30	0.600	2.607	43%	100.0%	0.0%		- 1						1					
#40	0.425	36%	36%	100.0%	0.0%		10%	+				-111111				HHH	+ +	10.0%
#50	0.300		22%	100.0%	0.0%		-						1	WIII				
#60	0.250		17%	100.0%	0.0%		nez L			ЩЩ				ř III				0.0%
#80	0.180		9%	100.0%	0.0%		U/0 46	100.00	00	10.000		.000	0.10	00	0.010)	0.0	
#100	0.150	6%	6%	100.0%	0.0%													
#140	0.106		4%	100.0%	0.0%					Particle:	Size (mm							
#170	0.090		4%	100.0%	0.0%													
#200	0.075	3.4%	3.4%	100.0%	0.0%	+ Sie	eve Sizes	5		Max Specs		 -	Min Specs	•		Sieve Resu	ults	
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Reviewed by:

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1825
Sample Date:	7/15/2021
Test Date:	10/1/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT33-GB-11-18.5 ft

 Visual Soil Description:
 brown sand with silt

 Type of Specimen:
 Remolded Cylindrical Shear Box

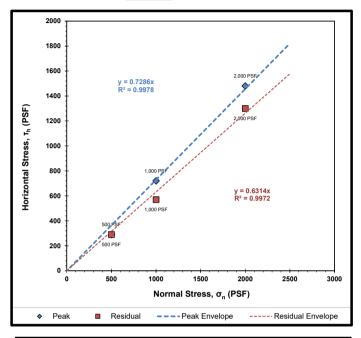
 Specimen Diameter (in):
 2.5

Summary of Samp	le Data:	σ _n =500 PSF
Initial Moisture Content (%):	27.4	
	Initial	Post-Consolidation
Dry Density (PCF):	105.9	106.9
Void Ratio:	0.591	0.577
Porosity (%):	37.2	36.6
Degree of Saturation (%):	saturated	saturated

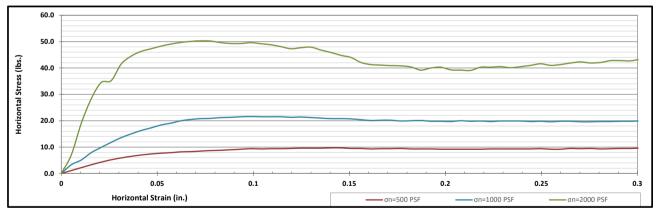
Summary of Sample	σ _n =1000 PSF	
Initial Moisture Content (%):	27.4	
	Initial	Post-Consolidation
Dry Density (PCF):	106.2	107.7
Void Ratio:	0.586	0.564
Porosity (%):	36.9	36.1
Degree of Saturation (%):	saturated	saturated

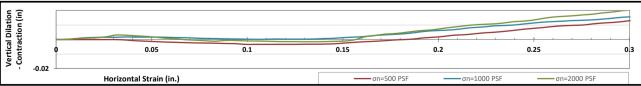
Summary of Samp	σ _n =2000 PSF	
Initial Moisture Content (%):	26.6	
	Initial	Post-Consolidation
Dry Density (PCF):	106.1	108.6
Void Ratio:	0.589	0.551
Porosity (%):	37.0	35.5
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS					
	PEAK	RESIDUAL			
Angle of Internal Friction, φ (°):	38	32			
Cohesion (PSF):	0	0			



Failure Envelope Test Values:						
Normal Stress, σ _n (PSF):	500	1000	2000			
Peak Horizontal Stress, τ _h (PSF):	290	720	1480			
Residual Horizontal Stress, τ _h (PSF):	290	570	1300			





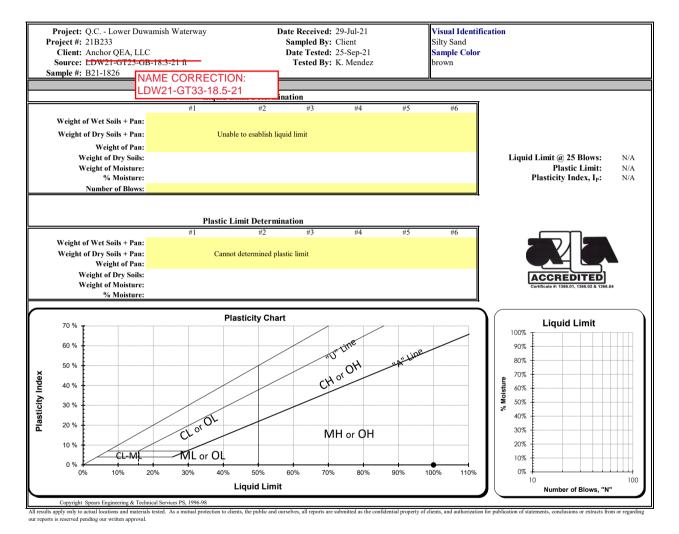
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ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils



Comments: Liquid limit cannot be established as the material displays rapid dilation. At lower moistures the material does not spread into the liquid limit device without tearing the soil cake. Plastic limit cannot be determined as the sample does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:

Meghan Blodgett-Carrillo

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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT33-GB-21-26.8 ft

Sample#: B21-1828

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 25-Sep-21 Tested By: K. Mendez Unified Soils Classification System, ASTM D-2487

ML, Sandy Silt Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{l} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.004 \\ \textbf{D}_{(10)} = 0.007 \\ \textbf{D}_{(15)} = 0.010 \\ \textbf{D}_{(30)} = 0.036 \\ \textbf{D}_{(50)} = 0.064 \\ \textbf{D}_{(60)} = 0.074 \\ \textbf{D}_{(90)} = 0.141 \\ \textbf{Partice} = 43/70 \\ \end{array}$ mm % Gravel = 0.0% % Sand = 38.9% mm % Silt & Clay = 61.1% mm mm Liquid Limit = 0.0% Plasticity Index = 0.0% mm Sand Equivalent = n/a mm

Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 2.51$ Coeff. of Uniformity, $C_U = 10.39$ Fineness Modulus = 0.10 Plastic Limit = 0.0%

Moisture %, as sampled = 34.4% Req'd Sand Equivalent =
Req'd Fracture %, 1 Face =

11	eq a riactare 70, r race
Reg	'd Fracture %, 2+ Faces =

						ust Ratio = 43/70	Fracture %, 2+ Fac	ees = n/a	Req'd Fracture %, 2+	Faces =
ASTM C136, ASTM D6913, ASTM C117										
		Actual	Interpolated				Grain Size Distributi	on		
CI.	CI.	7	Cumulative				4 .			
Sieve		Percent	Percent	Specs	Specs	5 % 5	2 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	88	
US	Metric	Passing	Passing	Max	Min	100%	•	— • × • × • • • • • • • • • • •	***	100.0%
12.00"	300.00		100%	100.0%	0.0%	-				1
10.00"	250.00		100%	100.0%	0.0%	[-]		i		1
8.00"	200.00		100%	100.0%	0.0%	90%				90.0%
6.00"	150.00		100%	100.0%	0.0%					1
4.00"	100.00		100%	100.0%	0.0%	80%				80.0%
3.00"	75.00		100%	100.0%	0.0%			\ \		
2.50"	63.00		100%	100.0%	0.0%	l l				1
2.00"	50.00	100%	100%	100.0%	0.0%	70%				70.0%
1.75"	45.00		100%	100.0%	0.0%				1	1
1.50"	37.50		100%	100.0%	0.0%				<u> </u>	1
1.25"	31.50		100%	100.0%	0.0%	60%			*	60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	o .				i g
3/4"	19.00	100%	100%	100.0%	0.0%	Di- 1888 88 50%				50.0% _M
5/8"	16.00		100%	100.0%	0.0%	BK 30%				00.070 gg
1/2"	12.50	100%	100%	100.0%	0.0%	F 1			*	1
3/8"	9.50	100%	100%	100.0%	0.0%	40%				40.0%
1/4"	6.30		100%	100.0%	0.0%					1
#4	4.75	100%	100%	100.0%	0.0%					
#8	2.36		100%	100.0%	0.0%	30%			 	30.0%
#10	2.00	100%	100%	100.0%	0.0%					
#16	1.18		100%	100.0%	0.0%	20%			*	20.0%
#20	0.850		100%	100.0%	0.0%	20/6				20.0%
#30	0.600		100%	100.0%	0.0%					
#40	0.425	99%	99%	100.0%	0.0%	10%			##### N ###	10.0%
#50	0.300		97%	100.0%	0.0%					
#60	0.250		96%	100.0%	0.0%					*
#80	0.180		94%	100.0%	0.0%	0%	100.000 10.000	1.000 0.1	00 0.010	0.0%
#100	0.150	94%	94%	100.0%	0.0%					
#140	0.106		75%	100.0%	0.0%		Particle Size (mm)		
#170	0.090		68%	100.0%	0.0%					
#200	0.075	61.1%	61.1%	100.0%	0.0%	+ Sieve Sizes	——▲ — Max Specs	- Min Specs	Sieve Results	
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Reviewed by:



Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Unified Soils Classification System, ASTM D-2487 **Project #:** 21B233 ML. Sandy Silt Sampled By: Client Client: Anchor QEA Date Tested: 25-Sep-21 Sample Color Source: LDW21-GT33-GB-21-26.8 ft Tested By: K. Mendez brown Sample#: B21-1828 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Assumed Sp Gr: 2.65 Sieve Analysis Sample Weight: 75.85 **Grain Size Distribution** Hydroscopic Moist .: Soils Particle 3.68% Sieve Percent ACCREDITED Adj. Sample Wgt: 73.16 Size Passing Diameter 3.0" 100% 75.000 mm 2.0" 100% 50.000 mm Hydrometer Soils Particle 1.5" Reading Corrected Percent 100% 37.500 mm Minutes 1.25" 100% 31.500 mm Reading Passing Diameter 25.000 mm 0.0477 mm 25 34.2% 1.0" 100% 2 21.5 29 4% $0.0347 \ mm$ 3/4" 100% 19.000 mm 17.5 23.9% 0.0224 mm 5/8" 100% 16.000 mm 17.1% 0.0133 mm 1/2" 100% 12.500 mm 30 14.4% 0.0096 mm 3/8" 100% 9.500 mm 10.5 0.0069 mm 60 9.6% 1/4" 100% 6.300 mm 240 4.8% 0.0035 mm 100% 4.750 mm 3.5 #4 3 4% 0.0014 mm #10 100% 2.000 mm 1440 100% 0.850 mm #20 Liquid Limit: 0.0 % % Gravel: 0.0% #40 99% 0.425 mm % Sand: 38.9% Plastic Limit: 0.0 % #100 94% 0.150 mm % Silt: 54.2% Plasticity Index: 0.0 % #200 61.1% 0.075 mm 0.074 mm % Clay: 6.9% Silts 60.1% 0.050 mm 44.4% 0.020 mm 22.1% 0.005 mm Clays 6.9% 3.8% $0.002 \ mm$ Colloids 2.4% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: 2.0 - 0.05 mm 0.05 - 0.002 mm % Silt: < 0.002 mm % Clay: **USDA Soil Textural Classification** Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval. **Comments:** Reviewed by:

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ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C Lower Duwamish Wa Project #: 21B233 Client: Anchor QEA, LLC Source: LDW21-GT33-GB-21-26.8 Sample #: B21-1828	Sampled By: Client Date Tested: 25-Sep-21	Jnified Soils Classification System, ASTM D-2487 ML, Sandy Silt sample Color rown				
	Liquid Limit Determination					
	#1 #2 #3 #4 #5	#6				
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:	Unable to esablish liquid limit					
Weight of Pan:						
Weight of Dry Soils: Weight of Moisture:		Liquid Limit @ 25 Blows: N/A Plastic Limit: N/A				
% Moisture:		Plasticity Index, Ip: N/A				
Number of Blows:						
	Plastic Limit Determination #1 #2 #3 #4 #5	#6				
Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Weight of Pan: Weight of Dry Soils: Cannot determined plastic limit Weight of Dry Soils:						
Weight of Moisture: % Moisture:		Certificate #: 1366.01, 1366.02 & 1366.04				
70 % T	Plasticity Chart	Liquid Limit				
50 % 50 % 40 % 50 %	CH or OH	100%				
	OL Of OH MH or OH	40%				
10 % T	ML or OL	10%				
0%	30% 40% 50% 60% 70% 80% 90% 100	 i ┃				
070 1070 2070	Liquid Limit	10 100				
Copyright Spears Engineering & Technical Services P	Number of Blows, "N"					
	nutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients.	nts, and authorization for publication of statements, conclusions or extracts from or regarding				

Liquid limit cannot be established as the material displays rapid dilation. At lower moistures the material does not spread into the liquid limit device without tearing the soil cake. Plastic limit cannot be determined as the sample does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by: Meghan Blodgett-Carrillo

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ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Pı	Project: Q.C Lower Duw roject #: 21B233 Client: Anchor QEA, LLC Source: LDW21-GT33-GE ample #: B21-1829		Samp Date	eceived: 29-Jul-21 pled By: Client Tested: 25-Sep-21 sted By: K. Mendez	Visual Identific Silty Sand Sample Color brown	cation	
		#1	#2	#3 #4	#5	#6	
	Weight of Wet Soils + Pan:						
	Weight of Dry Soils + Pan:						
	Weight of Pan:						
	Weight of Dry Soils: Weight of Moisture:	Liquid Limit @ 25 Blows: N/A Plastic Limit: N/A					
	% Moisture:	Plasticity Index, I _P : N/A					
	Number of Blows:						
			it Determination				
	Weight of Wet Soils + Pan:	#1	#2	#3 #4	#5	#6	
	Weight of Dry Soils + Pan:						
	Weight of Pan:						
	Weight of Dry Soils: Weight of Moisture:	ACCREDITED Cortificate #: 1366.01, 1366.02 & 1366.04					
	% Moisture:						Strate 3: 1550.01, 1550.02 & 1550.03
		Plaet	icity Chart				
	⁷⁰ % T	Flast	icity Chart				Liquid Limit
	60 %			ine			90%
				"U" Line	سعملنك.		80%
×	50 %			, OH			70%
nde	40 %			CH or OH			en 70%
Plasticity Index	30 %						woisum 60%
stic	30 %	Cl or OL					% 40%
Pla	20 %		30%				
	10 %	20%					
	CL-ML		10%				
	0% 10%	0%					
		Lic	uid Limit				10 100 Number of Blows, "N"
	Copyright Spears Engineering & Technology						

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Liquid limit cannot be established as the material displays rapid dilation. At lower moistures the material does not spread into the liquid limit device without tearing the soil cake. Plastic limit cannot be determined as the sample does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by: Meghan Blodgett-Carrillo

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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233

Source: LDW21-GT33-GB-28.8-29.5 ft Sample#: B21-1830

Client: Anchor QEA

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 25-Sep-21 Tested By: K. Mendez Unified Soils Classification System, ASTM D-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{c} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.010 \\ \textbf{D}_{(10)} = 0.047 \\ \textbf{D}_{(15)} = 0.061 \\ \textbf{D}_{(30)} = 0.096 \\ \textbf{D}_{(50)} = 0.158 \\ \textbf{D}_{(60)} = 0.213 \\ \textbf{D}_{(90)} = 0.378 \\ \textbf{Patio} = -7/30 \\ \end{array}$ mm % Gravel = 0.0% % Sand = 77.0% mm % Silt & Clay = 23.0% mm mm Liquid Limit = n/a Plasticity Index = n/a mm Sand Equivalent = n/a mm

Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 0.90$ Coeff. of Uniformity, $C_U = 4.50$ Fineness Modulus = 0.78

Plastic Limit = n/a Moisture %, as sampled = 33.6% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

					Du	st Ratio =	7/30	Fract	ure %, 2+ Fac	es = n/a	Req'd F	racture %, 2	2+ Faces =
				AS	TM C136, AST	M D6913, A	STM C117						
		Actual	Interpolated					G	rain Size Distributio	n			
		7	Cumulative	_	-			Ę.	_				
	Size	Percent	Percent	Specs	Specs		ون من ظ	4 % 6/3/:	5/8''.'' 3/8''.'' # # 4 10	5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	8458		
US	Metric	Passing	Passing	Max	Min		100%		****			T	T 100.0%
12.00"	300.00		100%	100.0%	0.0%					111111			
10.00"	250.00		100%	100.0%	0.0%		[]						
8.00"	200.00		100%	100.0%	0.0%		90%						90.0%
6.00"	150.00		100%	100.0%	0.0%								
4.00"	100.00		100%	100.0%	0.0%		80%						80.0%
3.00"	75.00		100%	100.0%	0.0%								1
2.50"	63.00		100%	100.0%	0.0%		1						
2.00"	50.00	100%	100%	100.0%	0.0%		70%						70.0%
1.75"	45.00		100%	100.0%	0.0%					1			
1.50"	37.50		100%	100.0%	0.0%								
1.25"	31.50		100%	100.0%	0.0%		60%					1-111111	60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	ů.	1						assing
3/4"	19.00	100%	100%	100.0%	0.0%	% Possing	50%				1		50.0%
5/8"	16.00		100%	100.0%	0.0%	98	50%				ŧ .		30.0% 88
1/2"	12.50	100%	100%	100.0%	0.0%		F 1				1		
3/8"	9.50	100%	100%	100.0%	0.0%		40%				-		40.0%
1/4"	6.30		100%	100.0%	0.0%						\		
#4	4.75	100%	100%	100.0%	0.0%						1		
#8	2.36		100%	100.0%	0.0%		30%				1		30.0%
#10	2.00	100%	100%	100.0%	0.0%		1				N. III		
#16	1.18		99%	100.0%	0.0%		20%				*		20.0%
#20	0.850		99%	100.0%	0.0%		20%				III NIIII I		20.0%
#30	0.600		99%	100.0%	0.0%		FI				1111/1111		
#40	0.425	99%	99%	100.0%	0.0%		10%						10.0%
#50	0.300		76%	100.0%	0.0%							*_	
#60	0.250		67%	100.0%	0.0%							*	
#80	0.180		54%	100.0%	0.0%		0%	100.000	10.000	1.000	0.100	0.010	0.0%
#100	0.150	48%	48%	100.0%	0.0%								
#140	0.106		34%	100.0%	0.0%				Particle Size (n	nm)			
#170	0.090		28%	100.0%	0.0%								
#200	0.075	23.0%	23.0%	100.0%	0.0%		Sieve Sizes		- Max Specs	Min Sp	oecs —	Sieve Re	sults
	t Spears Engineering & Tec		l .										
				and ourselves, all reports are		2.1 2.0.1	. 1 / 1 / /	C 11' C	Catatamanta associa				F 10

Reviewed by: Meghan Blodgett-Carrillo



Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Unified Soils Classification System, ASTM D-2487 **Project #:** 21B233 Sampled By: Client SM, Silty Sand Client: Anchor QEA Date Tested: 25-Sep-21 Sample Color Source: LDW21-GT33-GB-28.8-29.5 ft Tested By: K. Mendez brown Sample#: B21-1830 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Assumed Sp Gr: 2.65 Sieve Analysis Sample Weight: 80.02 **Grain Size Distribution** Hydroscopic Moist .: 4.80% Soils Particle Sieve Percent ACCREDITED Adj. Sample Wgt: 76.35 Size Passing Diameter 3.0" 100% 75.000 mm 2.0" 100% 50.000 mm Hydrometer Soils Particle 1.5" Reading Corrected Percent 100% 37.500 mm Minutes 1.25" 100% 31.500 mm Reading Passing Diameter 25.000 mm 10.5% 0.0529 mm 1.0" 100% 9.2% $0.0376\ mm$ 3/4" 100% 19.000 mm 7.2% 0.0240 mm 5/8" 100% 16.000 mm 6.5% 0.0139 mm 1/2" 100% 12.500 mm 30 5.2% 0.0098 mm 3/8" 100% 9.500 mm 0.0070 mm 60 2.6% 1/4" 100% 6.300 mm 240 2.0% 0.0035 mm 100% 4.750 mm 1.5 #4 1.3% 0.0014 mm #10 100% 2.000 mm 1440 99% 0.850 mm #20 0.0% Liquid Limit: n/a % Gravel: #40 99% 0.425 mm % Sand: 77.0% Plastic Limit: n/a #100 48% 0.150 mm % Silt: 20.8% Plasticity Index: n/a #200 23.0% 0.075 mm 0.074 mm % Clay: 2.2% Silts 22.4% 10.9% 0.050 mm 0.020 mm 6.9% 2.2% 0.005 mm Clays 1.5% $0.002 \ mm$ Colloids 0.9% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: 2.0 - 0.05 mm 0.05 - 0.002 mm % Silt: % Clay: < 0.002 mm **USDA Soil Textural Classification** All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval. **Comments:** Reviewed by: Meghan Blodgett-Carrillo

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ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Pı	Project: Q.C Lower Duw roject #: 21B233 Client: Anchor QEA, LLC Source: LDW21-GT33-GI ample #: B21-1831	2	Date Received: 29-Jul-21 Sampled By: Client Sandy Silt Date Tested: 25-Sep-21 Tested By: K. Mendez Visual Identifi Sandy Silt Sample Color brown					cation	
		#1	mit Determina #2	#3	#4	#5	#6		
	Weight of Wet Soils + Pan:								
	Weight of Dry Soils + Pan:								
	Weight of Pan:	Liquid Limit @ 25 Blows: No	/A						
	Weight of Dry Soils: Weight of Moisture:								/A /A
	% Moisture:								/A
	Number of Blows:								
			mit Determin						
	Weight of Wet Soils + Pan:	#1	#2	#3	#4	#5	#6		
	Weight of Dry Soils + Pan:								
	Weight of Pan:								
	Weight of Dry Soils: Weight of Moisture:							ACCREDITED Certificate #: 1366.01, 1366.02 & 1366.04	
	% Moisture:								
		Pla	sticity Chart					1	$\overline{}$
	^{70 %} F		otiony Gridit					Liquid Limit	,,,,,
	60 %				Line			90%	
				The state of the s	5	عمنائد		80%	
×	50 %				"Oh			70%	
Plasticity Index	40 %			Ch	or OH			0% 40% 40% 40% 40% 40% 40% 40% 40% 40% 4	
ξ	30 %							O 50%	
stic		ChorOL						40%	
Pla	20 %	30%							
	10 %		20%						
	0% CL-ML or OL							10%	
		20% 30% 40%	50%	60% 70%	80%	90% 1	100% 110%	0%	4
l		Number of Blows, "N"	100						
	Copyright Spears Engineering & Tech								

Liquid limit cannot be established as the material displays rapid dilation. At lower moistures the material does not spread into the liquid limit device without

tearing the soil cake. Plastic limit cannot be determined as the sample does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by: Meghan Blodgett-Carrillo

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Client:	Anchor QEA	Date:	October 19, 2021
Address:	21328 2nd Drive SE	Project:	Q.C Lower Duwamish Waterway
	Bothell, WA 98021	Project #:	21B233
Attn:	Garrett Timm	Sample #:	B21-1948 - 1965
Revised on:		Date sampled:	July 16, 2021

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	Please See Attached Reports		Sulfate Soundness	
	Proctor	-		Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count			LA Abrasion	
X	Moisture Content	Please See Attached Report	X	Direct Shear	Please See Attached Reports
	Specific Gravity, Coarse		X	Specific Gravity, Soils	Please See Attached Reports
	Specific Gravity, Fine				
X	Hydrometer Analysis	Please See Attached Reports			
X	Atterberg Limits	Please See Attached Reports			
	_				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted, Meghan Blodgett-Carrillo

WABO Supervising Laboratory Technician



Moisture Content - ASTM C566, ASTM D2216

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: October 1, 2021	Tested by: A. Eifrig

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B21-1948	LDW21-GT39-GB-0-1.5 ft	182.2	359.3	304.7	54.6	122.5	44.6%
B21-1949	LDW21-GT39-GB-0-8.8 ft	229.5	1120.6	890.6	230.0	661.1	34.8%
B21-1950	LDW21-GT39-GB-8.8-10.5 ft	234.3	1839.1	1517.6	321.5	1283.3	25.1%
B21-1951	LDW21-GT39-GB-10.5-12 ft	222.9	1270.1	1072.1	198.0	849.2	23.3%
B21-1952	LDW21-GT39-GB-10.5-20.5 ft	228.8	652.9	584.6	68.3	355.8	19.2%
B21-1953	LDW21-GT39-GB-20.5-21 ft	225.2	577.3	508.6	68.7	283.4	24.2%
B21-1954	LDW21-GT39-GB-20.5-30.5 ft	234.4	1327.0	1148.4	178.6	914.0	19.5%
B21-1955	LDW21-GT39-GB-30.5-32 ft	233.2	876.4	747.6	128.8	514.4	25.0%
B21-1956	LDW21-GT23-GB-0-1.5 ft	223.0	462.7	361.7	101.0	138.7	72.8%
B21-1957	LDW21-GT23-GB-0-8.2 ft	221.9	900.9	625.0	275.9	403.1	68.4%
B21-1958	LDW21-GT23-GB-8.5-10 ft	215.4	919.5	775.8	143.7	560.4	25.6%
B21-1959	LDW21-GT23-GB-8.5-17.6 ft	234.7	1060.0	934.4	125.6	699.7	18.0%
B21-1960	LDW21-GT23-GB-17.6-18.5 ft	217.3	972.1	771.5	200.6	554.2	36.2%
B21-1961	LDW21-GT23-GB-18.5-20 ft	270.1	687.9	581.4	106.5	311.3	34.2%
B21-1962	LDW21-GT23-GB-21.1-22.8 ft	222.3	1022.4	815.3	207.1	593.0	34.9%
B21-1963	LDW21-GT23-GB-22.8-26.8 ft	266.3	870.9	724.1	146.8	457.8	32.1%
B21-1964	LDW21-GT23-GB-27.7-28.5 ft	224.7	963.8	779.9	183.9	555.2	33.1%
B21-1965	LDW21-GT23-GB-30.5-32 ft	235.2	627.7	539.1	88.6	303.9	29.2%
				California and and administration			

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:

Meghan Blodgett-Carrillo



Moisture Content - ASTM D854

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: September 20, 2021	Tested by: A. Eifrig

Sample #	Location	Tare	Tare	Mass of Dry Soil	Pycno ID		Pycno	Density of Water @ Tx	soils	Mass of Pycno filled w/ water	Water, 0.1 *C	SpG of Soils	Factor	SpG
B21-1952	LDW21-GT39-GB-10.5-20.5 ft	493.16	568.87	75.7	TSA-014	192.3	499.5	0.99858	738.22	691.08		2.6499101		2.6508905
B21-1957	LDW21-GT23-GB-0-8.2 ft	584.01	660.92	76.9	TSA-013	184.0	499.7	0.99858	729.36	682.95	18.1	2.5216018	1.00037	2.5225348
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all results apply only to actual locations and materials tested.	As a mutual protection to clients, the public and ourselves, a	all reports are submitted as the confidential property of cli	ients, and authorization for publication of statements, con	clusions or extracts from or regarding our reports is re	eserved pending our written approval.

Reviewed by:

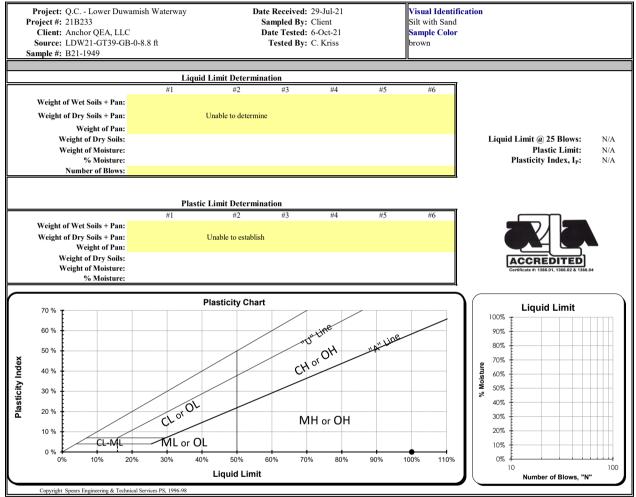
Meghan Blodgett-Carrillo

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ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils



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Comments: Liquid limit cannot be determined as the material displays rapid dilation. At lower moistures the sample does not spread into the cup without tearing the soil cake. Unable to establish plastic limit as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:

Meghan Blodgett-Carrillo

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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT39-GB-8.8-10.5 ft

Sample#: B21-1950

#100

#140

#170

#200

0.150

0.106

0.090

0.075

2.0%

Meghan Blodgett-Carrillo

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 4-Oct-21

Tested By: K. Mendez

Unified Soil Classification System, ASTM-2487

SP, Poorly graded Sand

Sample Color:

grayish-brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications

No Specs

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{AS IM D43} \\ \textbf{D}_{(5)} = 0.157 \\ \textbf{D}_{(10)} = 0.187 \\ \textbf{D}_{(15)} = 0.218 \\ \textbf{D}_{(30)} = 0.311 \\ \textbf{D}_{(50)} = 0.471 \\ \textbf{D}_{(60)} = 0.777 \\ \textbf{D}_{(90)} = 1.696 \end{array}$ mm % Gravel = 0.0% % Sand = 98.0% mm % Silt & Clay = 2.0% mm mm Liquid Limit = n/a mm Plasticity Index = n/amm Sand Equivalent = n/a

Coeff. of Curvature, $C_C = 0.66$ Coeff. of Uniformity, $C_U = 4.15$ Fineness Modulus = 2.40 Plastic Limit = n/a

Moisture %, as sampled = 25.0% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

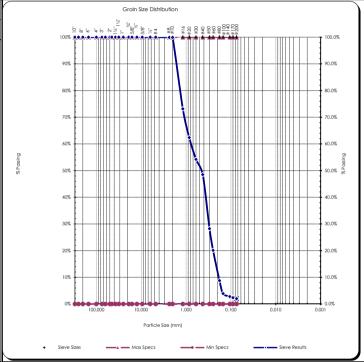
						$D_{(60)} = 0.777$		ım	Sand Equ			
						$D_{(90)} = 1.696$	o m	nm	Fracture %,	1 Face	= n/	a
					D	Oust Ratio = 1/2	4	Fı	racture %, 2-	+ Faces	= n/	a
				AS	STM C136, AS	TM D6913, AST	M C11	7				
		Actual	Interpolated						Grain Size Dis	stribution		
		-	Cumulative						=_			
Sieve		Percent	Percent	Specs	Specs		ь	h la la la la la la	7 7 7 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	- so ^Q	# 20	}
US	Metric	Passing	Passing	Max	Min	_	100%		ina raa ay na a	<u>. </u>	-	7
12.00"	300.00		100%	100.0%	0.0%		- 1			1 1		Ш
10.00"	250.00		100%	100.0%	0.0%					111		Ш
8.00"	200.00		100%	100.0%	0.0%		90%			+++	-##	Ħ
6.00"	150.00		100%	100.0%	0.0%		ŀ			1111		
4.00"	100.00		100%	100.0%	0.0%		80%					
3.00"	75.00		100%	100.0%	0.0%		°0% F					П
2.50"	63.00		100%	100.0%	0.0%		- 1				Ĭ	
2.00"	50.00	100%	100%	100.0%	0.0%		70%			444-	1	Щ
1.75"	45.00		100%	100.0%	0.0%		- 1				1	
1.50"	37.50		100%	100.0%	0.0%		ŀ				N.	
1.25"	31.50		100%	100.0%	0.0%		60%			++-+-	-+	++
1.00"	25.00	100%	100%	100.0%	0.0%	20	F				Ŋ	Ш
3/4"	19.00	100%	100%	100.0%	0.0%	% Powing						١
5/8"	16.00		100%	100.0%	0.0%	96	50%					•
1/2"	12.50	100%	100%	100.0%	0.0%							1
3/8"	9.50	100%	100%	100.0%	0.0%		40%			444		Ш
1/4"	6.30		100%	100.0%	0.0%		t					
#4	4.75	100%	100%	100.0%	0.0%		ł					Ш
#8	2.36		100%	100.0%	0.0%		30%			+++-	-	Н
#10	2.00	100%	100%	100.0%	0.0%		F					Ш
#16	1.18		73%	100.0%	0.0%							Ш
#20	0.850		62%	100.0%	0.0%		20%				-	Ħ
#30	0.600		54%	100.0%	0.0%		- 1					
#40	0.425	49%	49%	100.0%	0.0%		10%					Щ
#50	0.300		28%	100.0%	0.0%		1					Ш
#60	0.250		20%	100.0%	0.0%		ł					Ш
#80	0.180		9%	100.0%	0.0%		0%	100.000	10.000		1.000	1
	0.100	1	7.0	100.070	0.073	II .		100.000	10.000		1.000	

4%

3%

2%

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Comments: Reviewed by:

100.0%

100.0%

100.0%

100.0%



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT39-GB-10.5-20.5 ft

Sample#: B21-1952

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 4-Oct-21 Tested By: K. Mendez

SP-SM, Poorly graded Sand with Silt Sample Color:

grayish-brown

ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs Sample Meets Specs? N/A

9%

8%

7.0%

 $\begin{array}{l} \textbf{AS IM D43} \\ \textbf{D}_{(5)} = 0.053 \\ \textbf{D}_{(10)} = 0.121 \\ \textbf{D}_{(15)} = 0.178 \\ \textbf{D}_{(30)} = 0.313 \\ \textbf{D}_{(50)} = 0.638 \\ \textbf{D}_{(60)} = 0.919 \\ \textbf{D}_{(90)} = 1.762 \end{array}$ mm % Gravel = 1.1% % Sand = 91.9% mm % Silt & Clay = 7.0% mm mm Liquid Limit = n/a mm Plasticity Index = n/amm

Unified Soil Classification System, ASTM-2487

Sand Equivalent = n/a Fracture %, 1 Face = n/a ces = n/a

Coeff. of Curvature, $C_C = 0.88$ Coeff. of Uniformity, $C_U = 7.60$ Fineness Modulus = 2.45

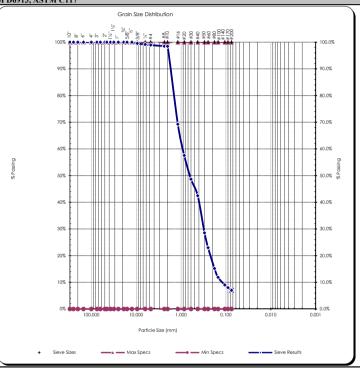
Plastic Limit = n/a Moisture %, as sampled = 19.2% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

						$D_{(90)} = 1.762$	mm		racture %		
						ust Ratio = 1/6		Frac	cture %,	2+ Fa	ace
		A street	Total de la	AS	STM C136, AST	FM D6913, ASTM	I C117				
		Actual	Interpolated Cumulative			ľ			Grain Size [Distribu	ıtio
Siove	Size	Percent	Percent	Specs	Specs	-		54	Ę. :		
US	Metric	Passing	Passing	Max	Min		9 06 €	4 % % % ! %	3/8,	7	£
12.00"	300.00	1 assing	100%	100.0%	0.0%	1	100%			7	4
10.00"	250.00		100%	100.0%	0.0%						
8.00"	200.00		100%	100.0%	0.0%		90%	-		$\mathbb{H}\mathbb{H}$	4
6.00"	150.00		100%	100.0%	0.0%						
4.00"	100.00		100%	100.0%	0.0%						
3.00"	75.00		100%	100.0%	0.0%		80%			$\parallel \parallel \parallel \parallel$	†
2.50"	63.00		100%	100.0%	0.0%						
2.00"	50.00	100%	100%	100.0%	0.0%		70%			Ш	_
1.75"	45.00		100%	100.0%	0.0%						
1.50"	37.50		100%	100.0%	0.0%						
1.25"	31.50		100%	100.0%	0.0%		60%			+++	+
1.00"	25.00	100%	100%	100.0%	0.0%	p p					ı
3/4"	19.00	100%	100%	100.0%	0.0%	% Possing	50%				ı
5/8"	16.00		100%	100.0%	0.0%	₩.	50%				
1/2"	12.50	100%	100%	100.0%	0.0%						
3/8"	9.50	100%	100%	100.0%	0.0%		40%			\mathbb{H}	4
1/4"	6.30		99%	100.0%	0.0%						
#4	4.75	99%	99%	100.0%	0.0%						
#8	2.36		99%	100.0%	0.0%		30%			$^{\rm HH}$	†
#10	2.00	98%	98%	100.0%	0.0%						
#16	1.18		69%	100.0%	0.0%		20%			Ш	_
#20	0.850		58%	100.0%	0.0%						ı
#30	0.600		49%	100.0%	0.0%		ł l				ı
#40	0.425	42%	42%	100.0%	0.0%		10%	-		HH	+
#50	0.300		29%	100.0%	0.0%		- []				
#60	0.250		23%	100.0%	0.0%			ШШШ	_L_U		┙
#80	0.180		15%	100.0%	0.0%		0%	00.000	10.000		
#100	0.150	12%	12%	100.0%	0.0%						
										ticle Size	

100.0%

100.0%

100.0%



Comments:

0.0%

0.0%

0.0%

Meghan Blodgett-Carrillo

7.0%

0.106

0.090

0.075

#140

#170

#200

Reviewed by:

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1952
Sample Date:	7/16/2021
Test Date:	10/4/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT39-GB-10.5-20.5 ft

 Visual Soil Description:
 grayish-brown sand

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

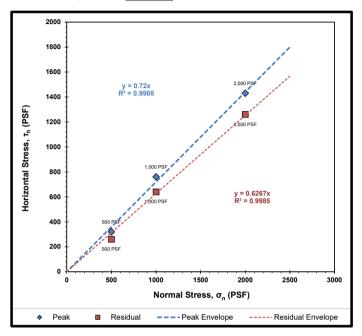
Specimen Height (in): 1
Rate of Strain (in/min): 0.0208
Estimated Specific Gravity of Solids: 2.65

Summary of Sample	e Data:	σ _n =500 PSF
Initial Moisture Content (%):	26.0	
	Initial	Post-Consolidation
Dry Density (PCF):	109.4	111.1
Void Ratio:	0.540	0.516
Porosity (%):	35.1	34.0
Degree of Saturation (%):	saturated	saturated

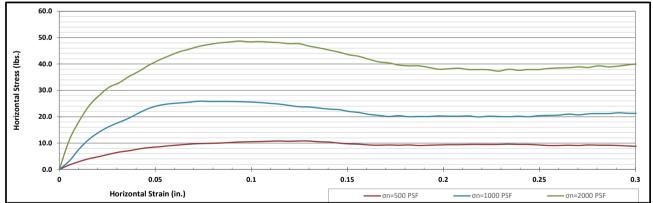
Summary of Samp	le Data:	σ _n =1000 PSF
Initial Moisture Content (%):	26.7	
	Initial	Post-Consolidation
Dry Density (PCF):	107.4	109.6
Void Ratio:	0.569	0.537
Porosity (%):	36.3	34.9
Degree of Saturation (%):	saturated	saturated

Summary of Samp	le Data:	σ _n =2000 PSF				
Initial Moisture Content (%):	25.2					
	Initial	Post-Consolidation				
Dry Density (PCF):	109.0	113.2				
Void Ratio:	0.546	0.488				
Porosity (%):	35.3	32.8				
Degree of Saturation (%):	saturated	saturated				

ESTIMATED STRENGTH PARAMETERS							
	PEAK	RESIDUAL					
Angle of Internal Friction, φ (°):	36	32					
Cohesion (PSF):	0	0					



Failure Envelope Test Values:								
Normal Stress, σ _n (PSF):	500	1000	2000					
Peak Horizontal Stress, τ _h (PSF):	320	760	1430					
Residual Horizontal Stress, τ _h (PSF):	260	640	1260					





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT39-GB-20.5-30.5 ft Sample#: B21-1954

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 4-Oct-21

Tested By: K. Mendez

Unified Soil Classification System, ASTM-2487

SP, Poorly graded Sand Sample Color:

gray



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{c} \textbf{ASTM D43} \\ \textbf{D}_{(5)} = 0.153 \\ \textbf{D}_{(10)} = 0.197 \\ \textbf{D}_{(15)} = 0.241 \\ \textbf{D}_{(30)} = 0.371 \\ \textbf{D}_{(50)} = 0.789 \\ \textbf{D}_{(60)} = 1.051 \end{array}$ mm % Gravel = 2.1% % Sand = 95.1% mm % Silt & Clay = 2.8% mm mm Liquid Limit = n/a Plasticity Index = n/aSand Equivalent = n/a

Coeff. of Curvature, $C_C = 0.67$ Coeff. of Uniformity, $C_U = 5.34$ Fineness Modulus = 2.73

Plastic Limit = n/a Moisture %, as sampled = 19.5% Rea'd Sand Equivalent =

	D(60) 1.051	111111	Dana Equivalent II a	reeq a Bana Equivalent	
	$D_{(90)} = 1.839$	mm	Fracture %, 1 Face = n/a	Req'd Fracture %, 1 Face =	
Du	st Ratio = 1/13		Fracture %, 2+ Faces = n/a	Req'd Fracture %, 2+ Faces =	
ГМ С136, AST	M D6913, ASTM	I C117			
			Grain Size Distribution		
Specs Min			3.7 2.7 11.5 11.5 13.6 2.6 2.7 2.6 2.7 2.7 2.7 2.7 2.7 2.7 2.7 2.7	- 100 0%	

				AS	TM C136, AS	FM D6913, ASTM C117
		Actual	Interpolated			
		Cumulative	Cumulative			Grain Size Distribution
Sieve	Size	Percent	Percent	Specs	Specs	で 10 で 10 で 10 で 10 で 10 で 10 で 10 で 10
US	Metric	Passing	Passing	Max	Min	100.0%
12.00"	300.00		100%	100.0%	0.0%	
10.00"	250.00		100%	100.0%	0.0%	
8.00"	200.00		100%	100.0%	0.0%	90%
6.00"	150.00		100%	100.0%	0.0%	
4.00"	100.00		100%	100.0%	0.0%	80%
3.00"	75.00		100%	100.0%	0.0%	80%
2.50"	63.00		100%	100.0%	0.0%	
2.00"	50.00	100%	100%	100.0%	0.0%	70%
1.75"	45.00		100%	100.0%	0.0%	
1.50"	37.50		100%	100.0%	0.0%	
1.25"	31.50		100%	100.0%	0.0%	60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	E 50.55 4 50.0
3/4"	19.00	100%	100%	100.0%	0.0%	
5/8"	16.00		100%	100.0%	0.0%	86 20% N
1/2"	12.50	99%	99%	100.0%	0.0%	
3/8"	9.50	99%	99%	100.0%	0.0%	40.0%
1/4"	6.30		98%	100.0%	0.0%	
#4	4.75	98%	98%	100.0%	0.0%	
#8	2.36		96%	100.0%	0.0%	30%
#10	2.00	96%	96%	100.0%	0.0%	
#16	1.18		65%	100.0%	0.0%	20.0%
#20	0.850		52%	100.0%	0.0%	20.0%
#30	0.600		43%	100.0%	0.0%	
#40	0.425	36%	36%	100.0%	0.0%	10%
#50	0.300		22%	100.0%	0.0%	
#60	0.250	1	16%	100.0%	0.0%	
#80	0.180		8%	100.0%	0.0%	0% 000 0 10.000 1.000 0.100 0.010 0.001
#100	0.150	5%	5%	100.0%	0.0%	
#140	0.106		4%	100.0%	0.0%	Particle Size (mm)
#170	0.090		3%	100.0%	0.0%	
#200	0.075	2.8%	2.8%	100.0%	0.0%	+ Sieve Sizes — Max Specs — Min Specs — Sieve Results
Copyright	Spears Engineering & Tec	chnical Services PS, 1996-9	3			

Meghan Blodgett-Carrillo

Reviewed by:

Materials Testing & Consulting, Inc. Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting



ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C Lower Duwamish Waterway Project #: 21B233 Client: Anchor QEA, LLC Source: LDW21-GT23-GB-0-8.2 ft Sample #: B21-1957				nte Received: Sampled By: Date Tested: Tested By:	Client 6-Oct-21		Visual Identifi Silt with Sand Sample Color brown	cation
		Liquid	l Limit Determi	nation				
		#1	#2	#3	#4	#5	#6	
Weight of	Wet Soils + Pan:	33.87	31.07	35.40				
Weight of	Dry Soils + Pan:	29.74	27.66	30.53				
	Weight of Pan:	19.98	19.72	19.51				
	ight of Dry Soils:	9.76	7.94	11.02				Liquid Limit @ 25 Blows: 42 %
Wei	ight of Moisture:	4.13	3.41	4.87				Plastic Limit: N/A
N	% Moisture: umber of Blows:	42.3 % 25	43.0 %	44.2 % 13				Plasticity Index, I_P: N/A
Weight of Wei	Wet Soils + Pan: Dry Soils + Pan: Weight of Pan: ight of Dry Soils: ight of Moisture:	#1	#2 Unable to establis	#3	#4	#5	#6	ACCREDITED Certificato #. 1366.01, 1366.02 & 1366.04
70 % 60 % 50 % 40 % 10 % 0% 0%	% Moisture:	(L) or O	L % 50%	CH M	H or OH	90%	100% 110%	Liquid Limit 50% 45% 40% 20% 15% 10% 100 100

Comments: Unable to establish plastic limit as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:

Meghan Blodgett-Carrillo

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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT23-GB-8.5-17.6 ft

Sample#: B21-1959

Comments:

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 4-Oct-21 Tested By: K. Mendez Unified Soil Classification System, ASTM-2487

SP-SM, Poorly graded Sand with Silt

Sample Color: grayish-brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Space

Sample Meets Specs? N/A

 $\begin{array}{c} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.056 \\ \textbf{D}_{(10)} = 0.102 \\ \textbf{D}_{(15)} = 0.142 \\ \textbf{D}_{(30)} = 0.292 \\ \textbf{D}_{(50)} = 0.667 \\ \textbf{D}_{(60)} = 1.020 \\ \textbf{D}_{(90)} = 2.624 \\ \textbf{Ratio} = -7/45 \end{array}$ mm % Gravel = 2.5% % Sand = 90.8% mm % Silt & Clay = 6.7% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a

mm Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 0.82$ Coeff. of Uniformity, $C_U = 10.03$ Fineness Modulus = 2.55

Plastic Limit = n/a Moisture %, as sampled = 18.0% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face =

					D	ust Ratio =	7/45		Fractu	re %, 2+	Faces =	n/a		Req'o	d Fract	ıre %,	2+ Fac	es =
				AS	TM C136, AS	ГМ D6913, A	STM C11	7										
			Interpolated						Gro	in Size Distri	oution							
		Cumulative	Cumulative						-	0120 013111	3011011							
Sieve		Percent	Percent	Specs	Specs		ь		, k Z	3/8"	e2 9 ### 9	282	8888	28				
US	Metric	Passing	Passing	Max	Min	_	100%			(# # # # # #	## # # # # # # # # # # # # # # # # # #		т-т	тттт	т-т	T 100.0%
12.00"	300.00		100%	100.0%	0.0%													1
10.00"	250.00		100%	100.0%	0.0%		1			111111								1
8.00"	200.00		100%	100.0%	0.0%		90%	1 1			N.	####	++-	*****			11	90.0%
6.00"	150.00		100%	100.0%	0.0%		ŀ				Ì							1
4.00"	100.00		100%	100.0%	0.0%		80%											80.0%
3.00"	75.00		100%	100.0%	0.0%		00% T											00.0%
2.50"	63.00		100%	100.0%	0.0%													1
2.00"	50.00	100%	100%	100.0%	0.0%		70%	$+-\parallel$			+++			####				70.0%
1.75"	45.00		100%	100.0%	0.0%		ļ.				\							1
1.50"	37.50		100%	100.0%	0.0%						l i							1
1.25"	31.50		100%	100.0%	0.0%		60%				++		++-		++-		++-	60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	0	ŀ											Ē
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	50%					N.						50.0% _{kg}
5/8"	16.00		100%	100.0%	0.0%	96	30,0					N.						30.0% %
1/2"	12.50	100%	100%	100.0%	0.0%							\						1
3/8"	9.50	99%	99%	100.0%	0.0%		40%					₩.		₩₩				40.0%
1/4"	6.30		98%	100.0%	0.0%													1
#4	4.75	97%	97%	100.0%	0.0%								V I					1
#8	2.36		89%	100.0%	0.0%		30%					####	i -			*****	11-	30.0%
#10	2.00	88%	88%	100.0%	0.0%								1					1
#16	1.18		65%	100.0%	0.0%		20%						1					20.0%
#20	0.850		55%	100.0%	0.0%		20,0						1					1 20.0%
#30	0.600		48%	100.0%	0.0%								1					}
#40	0.425	43%	43%	100.0%	0.0%		10%				-			,,,,,,,				10.0%
#50	0.300		31%	100.0%	0.0%		-							*				1
#60	0.250		26%	100.0%	0.0%													1
#80	0.180		19%	100.0%	0.0%		0%	100.00		10.000	1.00	040'6 - 00	0.	100	0.	010	0.	♣ 0.0% 001
#100	0.150	16%	16%	100.0%	0.0%													
#140	0.106		11%	100.0%	0.0%					Particle:	iize (mm)							
#170	0.090		9%	100.0%	0.0%													
#200	0.075	6.7%	6.7%	100.0%	0.0%		 Sieve Size 	5		Max Specs	_	 -	Min Specs			Sieve Re	esults	
Copyright	Spears Engineering & Tec	hnical Services PS, 1996-9	3															
ll results apply only to a	ctual locations and material	s tested. As a mutual prote	ction to clients, the public	and ourselves, all reports are	submitted as the confide	ntial property of clien	ts, and authoriza	ition for pu	blication of st	atements, cor	clusions or	extracts f	from or reg	arding ou	r reports is	reserved p	ending ou	written approv

Reviewed by: Meghan Blodgett-Carrillo

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-1959
Sample Date:	7/16/2021
Test Date:	10/5/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT23-GB-8.5-17.6 ft

 Visual Soil Description:
 grayish-brown sand

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

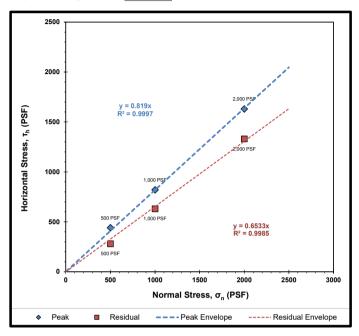
Specimen Height (in): 1
Rate of Strain (in/min): 0.0208
Estimated Specific Gravity of Solids: 2.65

Summary of Sampl	e Data:	σ _n =500 PSF
Initial Moisture Content (%):	22.6	
	Initial	Post-Consolidation
Dry Density (PCF):	109.4	111.1
Void Ratio:	0.539	0.517
Porosity (%):	35.0	34.1
Degree of Saturation (%):	saturated	saturated

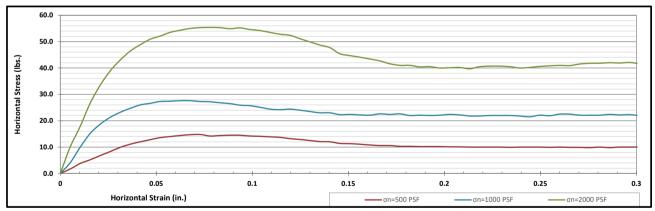
Summary of Samp	le Data:	σ _n =1000 PSF
Initial Moisture Content (%):	Moisture Content (%): 22.2 Initial Posensity (PCF): 110.1 Ratio: 0.531 ity (%): 34.7	
	Initial	Post-Consolidation
Dry Density (PCF):	110.1	111.8
Void Ratio:	0.531	0.507
Porosity (%):	34.7	33.7
Degree of Saturation (%):	saturated	saturated

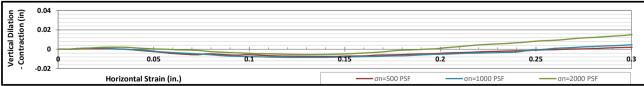
Summary of Samp	le Data:	σ _n =2000 PSF
Initial Moisture Content (%):	23.3	
	Initial	Post-Consolidation
Dry Density (PCF):	109.0	114.1
Void Ratio:	0.545	0.476
Porosity (%):	35.3	32.3
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS									
	PEAK	RESIDUAL							
Angle of Internal Friction, φ (°):	39	33							
Cohesion (PSF):	0	0							



Failure Envelope Test	Values:		
Normal Stress, σ _n (PSF):	500	1000	2000
Peak Horizontal Stress, τ _h (PSF):	440	820	1630
Residual Horizontal Stress, τ _h (PSF):	280	630	1330





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT23-GB-17.6-18.5 ft

Sample#: B21-1960

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 4-Oct-21 Tested By: K. Mendez Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color: grayish-brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Specs

Sample Meets Specs? N/A

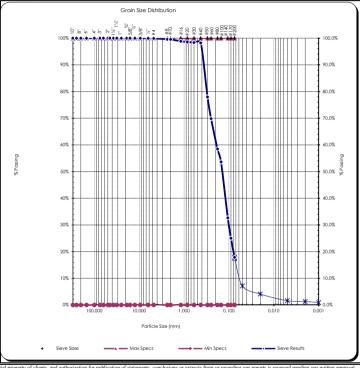
 $\begin{array}{c} D_{(5)} = 0.028 \\ D_{(10)} = 0.059 \\ D_{(15)} = 0.069 \\ D_{(30)} = 0.100 \\ D_{(50)} = 0.142 \\ \end{array}$ mm % Gravel = 0.1% % Sand = 82.0% mm % Silt & Clay = 17.9% mm mm Liquid Limit = n/a Plasticity Index = n/a $D_{(60)} = 0.189$ mm Sand Equivalent = n/a

Coeff. of Curvature, $C_C = 0.90$ Coeff. of Uniformity, $C_U = 3.20$ Fineness Modulus = 0.72

Plastic Limit = n/a Moisture %, as sampled = 36.2% Req'd Sand Equivalent =

	$D_{(90)} = 0.374$	mm	Fracture %, 1 Face =	n/a Req'd Fracture %, 1 Face =	
Dus	st Ratio = 2/11		n/a Req'd Fracture %, 2+ Faces =		
I C136, AST!	M D6913, ASTM	C117			
			Grain Size Distribution		
Specs		b		S S S S S S S S S S S S S S S S S S S	

				AS	TM C136, AS
		Actual	Interpolated		
		Cumulative	Cumulative		
Sieve	Size	Percent	Percent	Specs	Specs
US	Metric	Passing	Passing	Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		99%	100.0%	0.0%
#20	0.850		99%	100.0%	0.0%
#30	0.600		98%	100.0%	0.0%
#40	0.425	98%	98%	100.0%	0.0%
#50	0.300		78%	100.0%	0.0%
#60	0.250		70%	100.0%	0.0%
#80	0.180		59%	100.0%	0.0%
#100	0.150	54%	54%	100.0%	0.0%
#140	0.106		33%	100.0%	0.0%
#170	0.090		25%	100.0%	0.0%
#200	0.075	17.9%	17.9%	100.0%	0.0%
Convrigh	t Spears Engineering & Tec	hnical Services PS 1996-9	98		



Comments:

Meghan Blodgett-Carrillo

Reviewed by:



Hydrometer Report

-	-	Duwamish Wa	terway Date Recei			assification Sys	stem, ASTM-2487
Project #: 1	21B233		Sampled	By: Client	SM, Silty Sand		
Client :	Anchor QEA		Date Tes	sted: 4-Oct-21	Sample Color		
Source:	LDW21-GT2	3-GB-17.6-18.5	ft Tested	By: K. Mendez	grayish-brown		
Sample#:	B21-1960						
AS	STM D7928	, HYDROMI	ETER ANALYSI	S		ASTM	D6913
Assumed Sp Gr :	2.65					Sieve A	Analysis
Sample Weight:	75.28	grams				Grain Size	Distribution
Hydroscopic Moist.:	1.16%			25	Sieve	Percent	Soils Particle
Adj. Sample Wgt :	74.42	grams		ACCREDITED	Size	Passing	Diameter
		8		Certificate #: 1366.01	3.0"	100%	75.000 mm
Hydrometer					2.0"	100%	50.000 mm
Reading	Corrected	Percent	Soils Particle		1.5"	100%	37.500 mm
Minutes	Reading	Passing	Diameter		1.25"	100%	31.500 mm
1	5.5	7.4%	0.0537 mm		1.0"	100%	25.000 mm
2	4.5	6.0%	0.0381 mm		3/4"	100%	19.000 mm
5	3.5	4.7%	0.0243 mm		5/8"	100%	16.000 mm
15	2.5	3.3%	0.0141 mm		1/2"	100%	12.500 mm
30	2	2.7%	0.0100 mm		3/8"	100%	9.500 mm
60	1.5	2.0%	0.0071 mm		1/4"	100%	6.300 mm
240	1	1.3%	0.0035 mm		#4	100%	4.750 mm
1440	1	1.3%	0.0014 mm		#10	100%	2.000 mm
1110		1.570	0.0011 111111		#20	99%	0.850 mm
% Gravel:	0.1%	т	iquid Limit: n/a		#40	98%	0.425 mm
% Sand:	82.0%		Plastic Limit: n/a		#100	54%	0.150 mm
% Silt:	16.3%		sticity Index: n/a		#200	17.9%	0.075 mm
		rias	sucity index: 11/a				
% Clay:	1.6%				Silts	17.4%	0.074 mm
						7.2%	0.050 mm
					CI.	4.1%	0.020 mm
					Clays	1.6%	0.005 mm
					G. H. 14.	1.3%	0.002 mm
					Colloids	0.9%	0.001 mm
	USDA S	oil Textural (Classification				
		Particle Size					
% Sand:		2.0 - 0.05 mm					
% Silt:		0.05 - 0.002 mn	ı				
% Clay:		< 0.002 mm					
	USDA S	oil Textural (Classification				
		Sand					
A11		A	- E	-11	61		cation of statements, conclusions or extracts from or
regarding our reports is reserved pend			o clients, the public and ourselves,	aii reports are submitted as the cor	ninential property of clients,	and authorization for public	cation of statements, conclusions or extracts from or
Comments:							
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	(1 wyw to	agen was					
Reviewed by:	0						
1	Meghan Blodgett		·				

Materials Testing & Consulting, Inc. Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting



ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C Lower Du Project #: 21B233 Client: Anchor QEA, Ll Source: LDW21-GT23-G Sample #: B21-1962	LC GB-21.1-22.8 ft	9	te Received: Sampled By: Date Tested: Tested By:	Client 6-Oct-21		Visual Identifica Sandy Silt Sample Color brown	ation
Weight of Wet Soils + Par Weight of Dry Soils + Par Weight of Par Weight of Dry Soils Weight of Moisture % Moisture Number of Blow	1: U1 1: 5: 5: 6:	#2	#3 e	#4	#5	#6	Liquid Limit @ 25 Blows: N/A Plastic Limit: N/A Plasticity Index, I _p : N/A
Weight of Wet Soils + Par Weight of Dry Soils + Par Weight of Par Weight of Dry Soils Weight of Moisture % Moisture	#1 :: U :: U	imit Determin #2 nable to establish	#3	#4	#5	#6	ACCREDITED Certificate p. 1366.01, 1366.04 a 1366.04
70 % 60 % 50 % 40 % 20 % 10 % CL-Mi 0 % 10 % Copyright Spears Engineering & Te	CL of OL 20% 30% 40%	asticity Chart	CH	or OH H or OH % 80%	90% 10	00% 110%	Liquid Limit 100% 90% 80% 70% 60% 40% 30% 10 Number of Blows, "N"

Comments: Liquid limit cannot be determined as the material displays rapid dilation. At lower moistures the sample does not spread into the cup without tearing the soil cake. Unable to establish plastic limit as the material does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:

Meghan Blodgett-Carrillo

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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT23-GB-22.8-26.8 ft Sample#: B21-1963

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 4-Oct-21

Tested By: K. Mendez

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Space

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D431} \\ D_{(5)} = 0.011 \\ D_{(10)} = 0.053 \\ D_{(15)} = 0.063 \\ D_{(30)} = 0.090 \\ D_{(50)} = 0.126 \\ D_{(60)} = 0.143 \\ D_{(90)} = 0.353 \end{array}$ mm % Gravel = 0.0% % Sand = 78.3% mm % Silt & Clay = 21.7% mm mm Liquid Limit = n/a Plasticity Index = n/amm

Sand Equivalent = n/a Fracture %, 1 Face = n/a mm

Coeff. of Curvature, $C_C = 1.05$ Coeff. of Uniformity, $C_U = 2.69$

Fineness Modulus = 0.54 Plastic Limit = n/a Moisture %, as sampled = 32.1% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face =

					D	$D_{(90)} = 0.333$ Sust Ratio = 7/32	mm	Fracture 9	e %, 1 Fa % 2+ Fac				Tracture		
				AS		TM D6913, ASTM	C117	Tractare	, <u>2 - 1 ac</u>			requ	racture	70, 2 - 10	
		Actual	Interpolated					Crain S	ize Distributio	n.					
		Cumulative	Cumulative)II					
Sieve		Percent	Percent	Specs	Specs		b 10 10	3.7 17.7 5.8 7.7 5.8 7.7 7.7	2 7 1 8 2 1 1 S	2882	5 8 8 8 8 8	288			
US	Metric	Passing	Passing	Max	Min	1	00%		ਨ > ≟ == ਨਾਨਾਨਾ ਜਾ	-	* * * * * * * * * * * * * * * * * * *	•			T 100.0%
12.00"	300.00		100%	100.0%	0.0%						1				1
10.00"	250.00		100%	100.0%	0.0%		11				N I				1
8.00"	200.00		100%	100.0%	0.0%	1	90%				1				90.0%
6.00"	150.00		100%	100.0%	0.0%						III.				1
4.00"	100.00		100%	100.0%	0.0%		80%				li_				80.0%
3.00"	75.00		100%	100.0%	0.0%		1				11				00.0%
2.50"	63.00		100%	100.0%	0.0%						111				1
2.00"	50.00	100%	100%	100.0%	0.0%		70%				₩.				70.0%
1.75"	45.00		100%	100.0%	0.0%						1				1
1.50"	37.50		100%	100.0%	0.0%										1
1.25"	31.50		100%	100.0%	0.0%		60%				### #				60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	. S									, g
3/4"	19.00	100%	100%	100.0%	0.0%	% Possing	50%								50.0% lg
5/8"	16.00		100%	100.0%	0.0%	96	50%								30.0,0 80
1/2"	12.50	100%	100%	100.0%	0.0%										1
3/8"	9.50	100%	100%	100.0%	0.0%		40%								40.0%
1/4"	6.30		100%	100.0%	0.0%							\			1
#4	4.75	100%	100%	100.0%	0.0%							NIII I			1
#8	2.36		100%	100.0%	0.0%	:	30%		####			1			30.0%
#10	2.00	100%	100%	100.0%	0.0%							Milli			1
#16	1.18		100%	100.0%	0.0%		20%					8			20.0%
#20	0.850		99%	100.0%	0.0%	1	20,0					111			20.0%
#30	0.600		99%	100.0%	0.0%		- []					III\\ I I			1
#40	0.425	99%	99%	100.0%	0.0%		10%								10.0%
#50	0.300		83%	100.0%	0.0%								*		1
#60	0.250		77%	100.0%	0.0%								1 7	* *	1
#80	0.180		68%	100.0%	0.0%		0%	00.000 10.0		1.000	1 40 60	100	0.010		0.0%
#100	0.150	64%	64%	100.0%	0.0%					1.000	0.		0.010		
#140	0.106		39%	100.0%	0.0%				Particle Size (r	mm)					
#170	0.090		30%	100.0%	0.0%										
#200	0.075	21.7%	21.7%	100.0%	0.0%	+ Sie	eve Sizes	Max	Specs		Min Specs	-	Sie	ve Results	
	Spears Engineering & Tec	ļ													
				and ourselves, all reports are	submitted as the confide	ential property of clients, and a	uthorization	for publication of states	nents, conclusion	ons or extract	s from or reg	garding our r	eports is reser	ved pending	our written appr

Comments:

Meghan Blodgett-Carrillo

Reviewed by:



Hydrometer Report

Project:	Q.C Lower	Duwamish Wat	erway Date Recei	ved: 29-Jul-21	Unified Soil Cl	assification Sys	stem, ASTM-2487
Project #: 2	21B233		Sampled	By: Client	SM, Silty Sand		
Client :	Anchor QEA		Date Tes	sted: 4-Oct-21	Sample Color		
Source: 1	LDW21-GT23	3-GB-22.8-26.8	ft Tested	By: K. Mendez	brown		
Sample#: 1	B21-1963			·			
AS	STM D7928	, HYDROME	TER ANALYSI	S		ASTM	D6913
Assumed Sp Gr :	2.65					Sieve A	nalysis
Sample Weight:	76.06	grams				Grain Size l	Distribution
Hydroscopic Moist.:	1.08%	_			Sieve	Percent	Soils Particle
Adj. Sample Wgt :	75.25	grams		ACCREDITED	Size	Passing	Diameter
, ,		Ü		Certificate #: 1366.01	3.0"	100%	75.000 mm
Hydrometer					2.0"	100%	50.000 mm
Reading	Corrected	Percent	Soils Particle		1.5"	100%	37.500 mm
Minutes	Reading	Passing	Diameter		1.25"	100%	31.500 mm
1	7.5	10.0%	0.0532 mm		1.0"	100%	25.000 mm
2	6.5	8.6%	0.0378 mm		3/4"	100%	19.000 mm
5	5.5	7.3%	0.0240 mm		5/8"	100%	16.000 mm
15	4.5	6.0%	0.0139 mm		1/2"	100%	12.500 mm
30	3.5	4.6%	0.0099 mm		3/8"	100%	9.500 mm
60	2	2.7%	0.0070 mm		1/4"	100%	6.300 mm
240	1.5	2.0%	0.0035 mm		#4	100%	4.750 mm
1440	1	1.3%	0.0014 mm		#10	100%	2.000 mm
					#20	99%	0.850 mm
% Gravel:	0.0%	L	iquid Limit: n/a		#40	99%	0.425 mm
% Sand:	78.3%	P	lastic Limit: n/a		#100	64%	0.150 mm
% Silt:	19.5%	Plas	ticity Index: n/a		#200	21.7%	0.075 mm
% Clay:	2.3%				Silts	21.2%	0.074 mm
						9.8%	0.050 mm
						6.8%	0.020 mm
					Clays	2.3%	0.005 mm
						1.5%	0.002 mm
					Colloids	0.9%	0.001 mm
	USDA S	oil Textural C	Classification				
		Particle Size					
% Sand:		2.0 - 0.05 mm					
% Silt:		0.05 - 0.002 mm	ı				
% Clay:		< 0.002 mm					

	USDA S	oil Textural C	lassification				
		Sand					
			P . d . 1P . 1 . 1		61 61 65	1 4 1 2 6 18	
All results apply only to actual location regarding our reports is reserved pend			clients, the public and ourselves,	all reports are submitted as the con	fidential property of clients,	and authorization for public	ation of statements, conclusions or extracts from or
Comments:							
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	Mand Di	a frost and Ma					
	(I Wight Be	ingin inni a					
Reviewed by:	0						
1	Meghan Blodgett	-Carrillo					



Client:	Anchor QEA	Date:	October 19, 2021
Address:	21328 2nd Drive SE	Project:	Q.C Lower Duwamish Waterway
	Bothell, WA 98021	Project #:	21B233
Attn:	Garrett Timm	Sample #:	B21-2050-2069
Revised on:		Date sampled:	8-4-21 & 8-5-21

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	Please See Attached Reports		Sulfate Soundness	
	Proctor	-		Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count			LA Abrasion	
X	Moisture Content	Please See Attached Report	X	Direct Shear	Please See Attached Reports
	Specific Gravity, Coarse		X	Specific Gravity, Soils	Please See Attached Reports
	Specific Gravity, Fine				
X	Hydrometer Analysis	Please See Attached Reports			
X	Atterberg Limits	Please See Attached Reports			
	_				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted, Meghan Blodgett-Carrillo

WABO Supervising Laboratory Technician



Moisture Content - ASTM C566, ASTM D2216

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	-
Date Received: July 29, 2021	Sampled by: Client
Date Tested: October 8, 2021	Tested by: A. Eifrig

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B21-2050	LDW21-GT44-GB-0-5 ft	341.8	1294.0	1086.4	207.6	744.6	27.9%
B21-2051	LDW21-GT44-GB-5-6.1 ft	354.2	977.3	871.3	106.0	517.1	20.5%
B21-2052	LDW21-GT44-GB-6.1-6.5 ft	359.6	665.7	593.5	72.2	233.9	30.9%
B21-2053	LDW21-GT44-GB-5-10 ft	357.1	1289.6	1063.4	226.2	706.3	32.0%
B21-2054	LDW21-GT44-GB-10-11.5 ft	360.2	1379.9	1209.6	170.3	849.4	20.0%
B21-2055	LDW21-GT44-GB-10-15 ft	346.4	1230.1	1027.5	202.6	681.1	29.7%
B21-2056	LDW21-GT44-GB-15.5-16.5 ft	225.1	974.7	803.8	170.9	578.7	29.5%
B21-2057	LDW21-GT44-GB-15-20 ft	266.4	1004.4	805.9	198.5	539.5	36.8%
B21-2058	LDW21-GT44-GB-20-21.5 ft	301.2	1328.5	1051.3	277.2	750.1	37.0%
B21-2059	LDW21-GT44-GB-20-25 ft	224.4	1222.2	950.5	271.7	726.1	37.4%
B21-2060	LDW21-GT44-GB-25-28.7 ft	270.1	1116.1	1011.0	105.1	740.9	14.2%
B21-2061	LDW21-GT44-GB-28.7-30 ft	182.4	916.9	718.4	198.5	536.0	37.0%
B21-2062	LDW21-GT44-GB-30-31.5 ft	220.5	1200.8	943.4	257.4	722.9	35.6%
B21-2063	LDW21-GT48-GB-0-5 ft	234.7	1032.0	887.3	144.7	652.6	22.2%
B21-2064	LDW21-GT48-GB-5-6.5 ft	221.5	1216.7	1036.8	179.9	815.3	22.1%
B21-2065	LDW21-GT48-GB-5-10 ft	233.9	698.1	566.7	131.4	332.8	39.5%
B21-2066	LDW21-GT48-GB-10-15 ft	233.2	798.5	665.7	132.8	432.5	30.7%
B21-2067	LDW21-GT48-GB-15-18.2 ft	224.4	960.1	827.8	132.3	603.4	21.9%
B21-2068	LDW21-GT48-GB-18.2-19.5 ft	221.9	948.5	777.2	171.3	555.3	30.8%
B21-2069	LDW21-GT48-GB-20-21.6 ft	306.7	947.8	795.3	152.5	488.6	31.2%
					i i		
			Ī		Ī		

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:

Meghan Blodgett-Carrillo



Moisture Content - ASTM D854

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: September 20, 2021	Tested by: A. Eifrig

Sample #	Location	Tare	Tare	Mass of Dry Soil	Pycno ID		Pycno	Density of Water @ Tx	soils	Mass of Pycno filled w/ water	Water, 0.1 *C	SpG of Soils	Factor	SpG
B21-2055	LDW21-GT44-GB-10-15 ft	497.91	595.93	98.0	TSA-017	187.9	499.4	0.99858	747.34	686.58	18.1	2.630647		2.6316204
B21-2066	LDW21-GT48-GB-10-15 ft	510.08	607.93	97.9	TSA-011	190.3	499.5	0.99856	749.61	689.15	18.2	2.6169635	1.00035	2.6178795
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all results apply only to actual locations and materials tested.	As a mutual protection to clients, the public and ourselves, a	all reports are submitted as the confidential property of cli	ients, and authorization for publication of statements, con	clusions or extracts from or regarding our reports is re	eserved pending our written approval.

Reviewed by:

Meghan Blodgett-Carrillo



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT44-GB-0-5 ft Sample#: B21-2050

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 8-Oct-21

Tested By: A. Eifrig

Unified Soil Classification System, ASTM-2487

SW-SC, Well-graded Sand with Silty Clay

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{c} \textbf{AS IN D43} \\ \textbf{D}_{(5)} = 0.039 \\ \textbf{D}_{(10)} = 0.083 \\ \textbf{D}_{(15)} = 0.170 \\ \textbf{D}_{(30)} = 0.352 \\ \textbf{D}_{(50)} = 0.593 \\ \textbf{D}_{(60)} = 0.724 \\ \textbf{D}_{(90)} = 1.967 \end{array}$ mm % Gravel = 4.2% % Sand = 86.2% mm % Silt & Clay = 9.6% mm mm Liquid Limit = n/a mm Plasticity Index = n/a mm Sand Equivalent = n/a

mm Fracture %, 1 Face = n/a Faces = n/a

Coeff. of Curvature, $C_C = 2.07$ Coeff. of Uniformity, $C_U = 8.74$

Fineness Modulus = 2.51 Plastic Limit = n/a Moisture %, as sampled = 27.9% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

						$D_{(90)} - 1$				cture 70	
							9/35		Fractu	are %, 2	2+ I
			T . 1 . 1	AS	STM C136, AS	TM D6913, A	ASTM C117				
		Actual	Interpolated			r			Gr	rain Size D)istrik
6.	G.	¬	Cumulative	6	6	_			š* .		
	e Size	Percent	Percent	Specs	Specs		.6 G	9 4 6 6	1 % = %	, 8, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5,	4
US 12.00"	Metric	Passing	Passing	Max	Min	_	100%			***	*
	300.00		100%	100.0%	0.0%		ł I				N
10.00"	250.00		100%	100.0%	0.0%		90%				
8.00"	200.00		100%	100.0%	0.0%		70%				П
6.00"	150.00		100%	100.0%	0.0%						Ш
4.00"	100.00		100%	100.0%	0.0%		80%	ЩН	\coprod		4
3.00"	75.00		100%	100.0%	0.0%						
2.50"	63.00		100%	100.0%	0.0%						
2.00"	50.00	100%	100%	100.0%	0.0%		70%				++-
1.75"	45.00		100%	100.0%	0.0%		-				Ш
1.50"	37.50		100%	100.0%	0.0%		[]				Ш
1.25"	31.50		99%	100.0%	0.0%		60%				†
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5/8"	16.00		99%	100.0%	0.0%	6-	- E				Ш
1/2"	12.50	98%	98%	100.0%	0.0%		H				
3/8"	9.50	98%	98%	100.0%	0.0%		40%		HHH		+
1/4"	6.30		96%	100.0%	0.0%						
#4	4.75	96%	96%	100.0%	0.0%						
#8	2.36		91%	100.0%	0.0%		30%				Ħ
#10	2.00	91%	91%	100.0%	0.0%						
#16	1.18		76%	100.0%	0.0%		20%				Ш
#20	0.850	70%	70%	100.0%	0.0%		20,0				Ш
#30	0.600		51%	100.0%	0.0%		F				Ш
#40	0.425	37%	37%	100.0%	0.0%		10%		+++		#
#50	0.300		25%	100.0%	0.0%						Ш
#60	0.250	20%	20%	100.0%	0.0%	1	ļ				Ш
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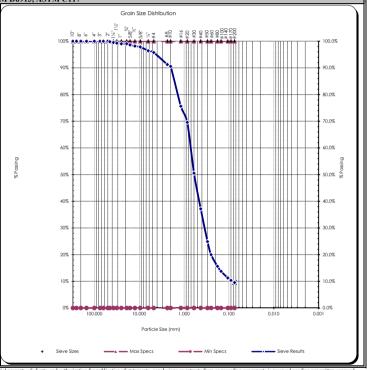
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Comments:

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Meghan Blodgett-Carrillo

9.6%

0.106

0.090

0.075

#140

#170

#200

Reviewed by:

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-2050
Sample Date:	8/4/2021
Test Date:	10/13/2021
Technician:	M. Carrillo

Sample Source: LDW21-GT44-GB-0-5 ft

Visual Soil Description: brown silty sand with gravel

Type of Specimen: Remolded Cylindrical Shear Box

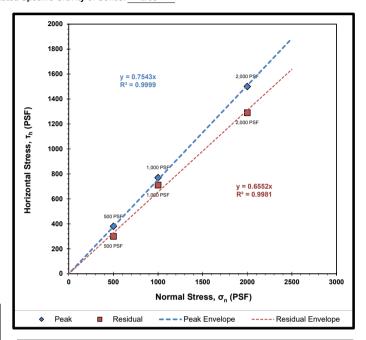
Specimen Diameter (in): 2.5

Summary of Sample	e Data:	σ _n =500 PSF
Initial Moisture Content (%):	24.6	
	Initial	Post-Consolidation
Dry Density (PCF):	109.7	110.8
Void Ratio:	0.536	0.520
Porosity (%):	34.9	34.2
Degree of Saturation (%):	saturated	saturated

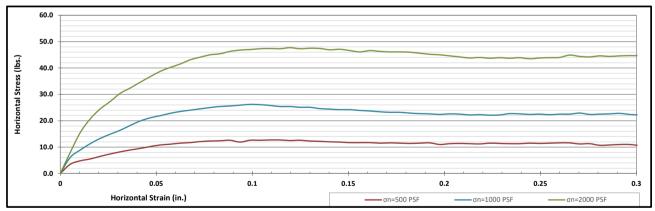
Summary of Sampl	σ _n =1000 PSF	
Initial Moisture Content (%):	23.8	
	Initial	Post-Consolidation
Dry Density (PCF):	110.7	113.4
Void Ratio:	0.523	0.486
Porosity (%):	34.3	32.7
Degree of Saturation (%):	saturated	saturated

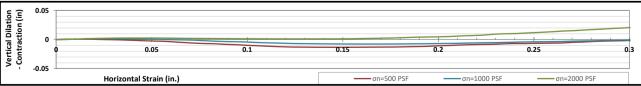
Summary of Samp	le Data:	σ _n =2000 PSF					
Initial Moisture Content (%):	23.8						
	Initial	Post-Consolidation					
Dry Density (PCF):	110.9	114.3					
Void Ratio:	0.520	0.473					
Porosity (%):	34.2	32.1					
Degree of Saturation (%):	saturated	saturated					

ESTIMATED STRENGTH PARAMETERS								
	PEAK	RESIDUAL						
Angle of Internal Friction, φ (°):	37	33						
Cohesion (PSF):	0	0						



Failure Envelope Test Values:									
Normal Stress, σ _n (PSF):	500	1000	2000						
Peak Horizontal Stress, τ _h (PSF):	380	770	1500						
Residual Horizontal Stress, τ _h (PSF):	300	710	1290						





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT44-GB-5-10 ft

Sample#: B21-2053

Comments:

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 8-Oct-21 Tested By: A. Eifrig Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color: dark brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Space

Sample Meets Specs? N/A

 $\begin{array}{c} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.031 \\ \textbf{D}_{(10)} = 0.062 \\ \textbf{D}_{(15)} = 0.081 \\ \textbf{D}_{(30)} = 0.112 \\ \textbf{D}_{(50)} = 0.154 \\ \textbf{D}_{(60)} = 0.178 \\ \textbf{D}_{(90)} = 0.247 \\ \textbf{Patic} = 9/74 \end{array}$ mm % Gravel = 0.0% % Sand = 88.0% mm % Silt & Clay = 12.0% mm mm Liquid Limit = n/a Plasticity Index = n/a mm Sand Equivalent = n/a

mm Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 1.14$ Coeff. of Uniformity, $C_U = 2.85$ Fineness Modulus = 0.59

Plastic Limit = n/a Moisture %, as sampled = 32.0% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face =

					D	ust Ratio =	9/74		Fractu	ire %, 2+ I	aces = 1	n/a		Req'd	Fractur	e %, 2-	Faces =
				AS	TM C136, AS	TM D6913, A	STM C11	7									
			Interpolated						Gr	ain Size Distrib	ution						
		Cumulative			1												
Sieve		Percent	Percent	Specs	Specs		ь			3/8"	∞2 28	8 2 8	8884	38			
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#8	2.36		100%	100.0%	0.0%		30%						+			++++	30.0%
#10	2.00	100%	100%	100.0%	0.0%		ŀ						li				1 1
#16	1.18		100%	100.0%	0.0%		20%										20.0%
#20	0.850	100%	100%	100.0%	0.0%		20% F										20.0%
#30	0.600		99%	100.0%	0.0%		F)			1 1
#40	0.425	99%	99%	100.0%	0.0%		10%	-						iî.			10.0%
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#60	0.250	91%	91%	100.0%	0.0%		ļ.										
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#170	0.090		19%	100.0%	0.0%												
#200	0.075	12.0%	12.0%	100.0%	0.0%		 Sieve Size 	s		Max Specs	_	• — мі	in Specs			Sieve Resu	lts
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				and ourselves, all reports are	submitted as the confide	ential property of clien	nts, and authoriz	ation for p	ublication of	statements, conc	lusions or ex	ctracts fro	m or rega	rding our	reports is re	served pen	ding our written ap

Reviewed by: Meghan Blodgett-Carrillo



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT44-GB-10-15 ft Sample#: B21-2055

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 8-Oct-21

Tested By: A. Eifrig dark brown

Unified Soil Classification System, ASTM-2487 SP-SM, Poorly graded Sand with Silt

Sample Color:



Specifications No Specs

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281 $\begin{array}{l} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.032 \\ \textbf{D}_{(10)} = 0.064 \\ \textbf{D}_{(15)} = 0.082 \\ \textbf{D}_{(30)} = 0.116 \\ \textbf{D}_{(50)} = 0.164 \\ \textbf{D}_{(60)} = 0.192 \\ \textbf{D}_{(90)} = 0.404 \\ \end{array}$ mm % Gravel = 0.0% % Sand = 88.2% mm % Silt & Clay = 11.8% mm mm Liquid Limit = n/a Plasticity Index = n/a

mm Sand Equivalent = n/a mm

Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 1.11$ Coeff. of Uniformity, $C_U = 3.02$

Fineness Modulus = 0.77 Plastic Limit = n/a

Moisture %, as sampled = 29.7% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

					D	ust Ratio = $11/85$	111111		acture %					'd Fract			
				AS		FM D6913, ASTM	C117				120		2100				
		Actual	Interpolated	2					Grain Size	Distributio	in.						
		Cumulative	Cumulative								711						
Sieve		Percent	Percent	Specs	Specs		b i. :	6 44 6 ½	. %		2 2 8 8	÷ 838	8458				
US	Metric	Passing	Passing	Max	Min	1	00%	*-*	- 0 9	⋗÷		# # # # # # # # # # # # # # # # # # #					T 100.0%
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1/2"	12.50	100%	100%	100.0%	0.0%		[]										}
3/8"	9.50	100%	100%	100.0%	0.0%		40%										40.0%
1/4"	6.30		100%	100.0%	0.0%								\				1
#4	4.75	100%	100%	100.0%	0.0%								1				1
#8	2.36		100%	100.0%	0.0%		30%						1		-11111		30.0%
#10	2.00	100%	100%	100.0%	0.0%								•				1
#16	1.18		100%	100.0%	0.0%		20%								шш		20.0%
#20	0.850	100%	100%	100.0%	0.0%								1				1
#30	0.600		95%	100.0%	0.0%		ł I						Ĭ.				1
#40	0.425	91%	91%	100.0%	0.0%		10%		-	+++-+				 			10.0%
#50	0.300		84%	100.0%	0.0%		- []										1
#60	0.250	81%	81%	100.0%	0.0%		[_]	_	J_ L []			IJ I. I					1
#80	0.180		56%	100.0%	0.0%		0%	100.000	10.000	00-10	1.000	0-00-00	0.100		0.010		→ 0.0% 0.001
#100	0.150	45%	45%	100.0%	0.0%												
#140	0.106		25%	100.0%	0.0%				Pe	article Size (r	mm)						
#170	0.090		18%	100.0%	0.0%												
#200	0.075	11.8%	11.8%	100.0%	0.0%	+ Si	eve Sizes	_	— Max Sp	ecs		— Min Spe	CS		Sieve F	Results	
Copyright	Spears Engineering & Tec	hnical Services PS, 1996-	98														

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Reviewed by:

Meghan Blodgett-Carrillo

Source: LDW21-GT44-GB-15-20 ft Sample#: B21-2057

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 8-Oct-21 Tested By: A. Eifrig

Visual Identification

Sandy Silt Sample Color: dark brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.006 \\ \textbf{D}_{(10)} = 0.012 \\ \textbf{D}_{(15)} = 0.018 \\ \textbf{D}_{(30)} = 0.036 \\ \textbf{D}_{(50)} = 0.060 \\ \textbf{D}_{(60)} = 0.072 \\ \textbf{D}_{(90)} = 0.216 \\ \textbf{Ratio} = 43.67 \end{array}$ mm % Gravel = 0.6% % Sand = 36.7% mm % Silt & Clay = 62.6% mm mm Liquid Limit = n/a mm Plasticity Index = n/a mm Sand Equivalent = n/a

Fineness Modulus = 0.29 Plastic Limit = n/a Moisture %, as sampled = 36.8% Req'd Sand Equivalent =

Coeff. of Curvature, $C_C = 1.50$ Coeff. of Uniformity, $C_U = 6.00$

mm Fracture %, 1 Face = n/a

Req'd Fracture %, 1 Face =
Req'd Fracture %, 2+ Faces =

					Du	ust Ratio = $43/67$	111111		Fracture	%, 2+ 1							2+ Fac	
ASTM C136, ASTM D6913, ASTM C117																		
		Actual	Interpolated						Grain	Size Distrik	oution							
			Cumulative		ı				i.									
Sieve		Percent	Percent	Specs	Specs		b _{in} :	6 4 5 6	, - X,	3/84	e2 2°	888	8885	28				
US	Metric	Passing	Passing	Max	Min	_	100%		••••	*****		<u> </u>	+++++	iii.	т-т	пптт	т-т	T 100.0%
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6.00"	150.00		100%	100.0%	0.0%		11						1 4					1
4.00"	100.00		100%	100.0%	0.0%		80%						}					80.0%
3.00"	75.00		100%	100.0%	0.0%		00%						\					1 00.0%
2.50"	63.00		100%	100.0%	0.0%		F						\					}
2.00"	50.00	100%	100%	100.0%	0.0%		70%				-		++-					70.0%
1.75"	45.00		100%	100.0%	0.0%													1
1.50"	37.50		100%	100.0%	0.0%)				1
1.25"	31.50		100%	100.0%	0.0%		60%					####	++		-		+	60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	20	- 1											1 :
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	[]											50.0%
5/8"	16.00		100%	100.0%	0.0%	95	50%											50.0%
1/2"	12.50	100%	100%	100.0%	0.0%		11											1
3/8"	9.50	99%	99%	100.0%	0.0%		40%			44444		ЩЩ		ЩЩ	<u> </u>			40.0%
1/4"	6.30		99%	100.0%	0.0%		11											1
#4	4.75	99%	99%	100.0%	0.0%		l l											ł
#8	2.36		99%	100.0%	0.0%		30%					₩₩			 	+++		30.0%
#10	2.00	99%	99%	100.0%	0.0%													1
#16	1.18	****	99%	100.0%	0.0%													1
#20	0.850	98%	98%	100.0%	0.0%		20%			****		11111		###		####	††	20.0%
#30	0.600	2070	98%	100.0%	0.0%													1
#40	0.425	98%	98%	100.0%	0.0%		10%			ШШ		ШШ		ШШ		ШШ		10.0%
#50	0.300	2070	95%	100.0%	0.0%		-5~					Ш				ШП		10.0,0
#60	0.250	94%	94%	100.0%	0.0%		F											ł
#80	0.180	2-170	85%	100.0%	0.0%		0%		200000				00 00 0			шш		0.0%
#100	0.150	81%	81%	100.0%	0.0%			100.000	10	.000	1.00	10	0.1	00	0.0	110	0.	001
#140	0.130	0170	70%	100.0%	0.0%					Particle S	ize (mm)							
#140 #170	0.106		66%	100.0%	0.0%													
#170	0.090	62.6%	62.6%	100.0%	0.0%		Pi Pi						:- C			Sieve R		
			ļ.	100.0%	0.0%	k * '	Sieve Sizes		— ▲ — Ma	x specs			Min Specs			■ sieve Ri	ZTIUCE	
		hnical Services PS, 1996-9		and ourselves, all reports are s				4 7.1										

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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

3/4"

5/8"

1/2"

3/8"

1/4"

#4

#8 #10

#16

#20

#30

#40

#50

#60

#80

#100 #140

#170

#200

Comments:

Source: LDW21-GT44-GB-20-25 ft Sample#: B21-2059

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 8-Oct-21 Tested By: A. Eifrig

Visual Identification Sandy Silt with Clay Sample Color: brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Dust Ratio = 17/20

Specifications No Specs

19.00

16.00

12.50

9.50

6.30

4.75

2.36

2.00

1.18

0.850

0.600

0.425

0.300

0.250

0.180

0.150

0.106

0.090

0.075

Sample Meets Specs? N/A

100%

100%

100%

100%

92%

78 5%

 $D_{(5)} = 0.001$ $D_{(10)} = 0.003$ mm % Gravel = 0.0%% Sand = 21.5% mm $D_{(15)} = 0.005$ % Silt & Clay = 78.5% mm $D_{(30)} = 0.014$ mm Liquid Limit = n/a $D_{(50)} = 0.032$ Plasticity Index = n/a $D_{(60)} = 0.048$ mm Sand Equivalent = n/a $D_{(90)} = 0.190$ mm Fracture %, 1 Face = n/a Fracture %, 2+ Faces = n/a

Plastic Limit = n/a Moisture %, as sampled = 37.4% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

Req'd Fracture %, 2+ Faces =

Coeff. of Curvature, $C_C = 1.61$ Coeff. of Uniformity, $C_U = 17.87$

Fineness Modulus = 0.40

ASTM C136, ASTM D6913, ASTM C117 Interpolated Actual Cumulative Cumulative Sieve Size Percent Percent Specs Metric Passing Passing Max 12.00 100.0% 10.00" 250.00 100% 100.0% 200.00 100% 100.0% 8.00" 100% 100.0% 6.00' 150.00 4.00" 100.00 100% 100.0% 3.00" 75.00 100% 100.0% 2.50" 63.00 100% 100.0% 2.00" 50.00 100% 100% 100.0% 1.75" 45.00 100% 100.0% 100% 100.0% 1.50" 37.50 1.25" 100% 100.0% 31.50 100.0% 1.00" 25.00 100% 100%

100%

100%

100%

100%

100%

100%

94%

93%

93%

93%

93%

92%

91%

91%

90%

90%

83%

81%

78.5%

100.0%

100.0%

100.0%

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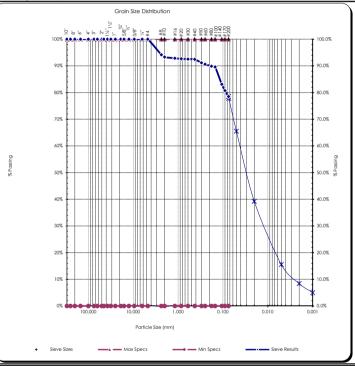
100.0%

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100.0%

Specs	
Min	
0.0%	
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0.0%	
0.0%	
0.0%	
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0.0%	
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0.0%	
0.0%	
0.0%	g.
0.0%	Pass
0.0%	96
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Reviewed by: Meghan Blodgett-Carrillo



Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Visual Identification **Project #:** 21B233 Sandy Silt with Clay Sampled By: Client Client: Anchor QEA Date Tested: 8-Oct-21 Sample Color **Source:** LDW21-GT44-GB-20-25 ft Tested By: A. Eifrig brown Sample#: B21-2059 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Assumed Sp Gr: Sieve Analysis 2.65 Sample Weight: 75.15 **Grain Size Distribution** Hydroscopic Moist .: 3.83% Soils Particle Sieve Percent ACCREDITED Adj. Sample Wgt: 72.38 Size Passing Diameter 3.0" 100% 75.000 mm 2.0" 100% 50.000 mm Hydrometer Soils Particle 1.5" Reading Corrected Percent 100% 37.500 mm Minutes 1.25" 100% 31.500 mm Reading Passing Diameter 25.000 mm 55.4% 0.0414 mm 1.0" 100% 2 38 49.0% $0.0307 \ mm$ 3/4" 100% 19.000 mm 31 40.0% 0.0204 mm 5/8" 100% 16.000 mm 27.1% 0.0127 mm 1/2" 100% 12.500 mm 30 23.2% 0.0091 mm 3/8" 100% 9.500 mm 18 60 15 19.3% 0.0065 mm 1/4" 100% 6.300 mm 240 0.0034 mm 100% 4.750 mm 11.6% #4 0.0014 mm #10 2.000 mm 1440 5.5 7.1% 93% #20 93% 0.850 mm Liquid Limit: n/a % Gravel: 0.0% #40 92% 0.425 mm % Sand: 21.5% Plastic Limit: n/a #100 90% 0.150 mm % Silt: 63.0% Plasticity Index: n/a #200 78.5% 0.075 mm 0.074 mm % Clay: 15.5% Silts 77.8% 65.5% 0.050 mm 0.020 mm 39.3% 15.5% 0.005 mm Clays 8.4% $0.002 \ mm$ Colloids 5.0% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: 2.0 - 0.05 mm 0.05 - 0.002 mm % Silt: < 0.002 mm % Clay: **USDA Soil Textural Classification** All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval. **Comments:**

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Reviewed by:

Meghan Blodgett-Carrillo



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT44-GB-25-28.7 ft

Sample#: B21-2060

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 8-Oct-21

Tested By: A. Eifrig

SP, Poorly graded Sand

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{l} \textbf{ASIM D4318} \\ \textbf{D}_{(5)} = 0.370 \\ \textbf{D}_{(10)} = 0.495 \\ \textbf{D}_{(15)} = 0.577 \\ \textbf{D}_{(30)} = 0.822 \\ \textbf{D}_{(50)} = 1.264 \\ \textbf{D}_{(60)} = 1.490 \\ \textbf{D}_{(90)} = 14.510 \\ \textbf{Patio} = -6/33 \\ \end{array}$ mm % Gravel = 11.1% % Sand = 87.4% mm % Silt & Clay = 1.5% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a

Unified Soils Classification System, ASTM D-2487

mm Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 0.92$ Coeff. of Uniformity, $C_U = 3.01$ Fineness Modulus = 3.78

Plastic Limit = n/a Moisture %, as sampled = 14.2% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

						2(90)		1140	1410 70, 1 14			a rractare 70,	
					D	Oust Ratio =	6/23	Fractu	re %, 2+ Fac	es = n/a	Req'd I	Fracture %, 2+	+ Faces =
				AS	TM C136, AS	TM D6913, A	STM C117						
		Actual	Interpolated					Gro	in Size Distributio	on			
		7	Cumulative			_							
	e Size	Percent	Percent	Specs	Specs		b in 1.	7 6 6 6 7 6 7 6	8 ₂ 8 1.4 85 	588485	3 88 8 8 8 8		
US	Metric	Passing	Passing	Max	Min	-	100%		, ₆₀ ~ = ==		****		T 100.0%
12.00"	300.00		100%	100.0%	0.0%		F	1111					1 1
10.00"	250.00		100%	100.0%	0.0%		11	-					1 1
8.00"	200.00		100%	100.0%	0.0%		90%		*******				90.0%
6.00"	150.00		100%	100.0%	0.0%		<u> </u>		- III N.				
4.00"	100.00		100%	100.0%	0.0%		80%			i			80.0%
3.00"	75.00		100%	100.0%	0.0%		00%						00.00
2.50"	63.00		100%	100.0%	0.0%		F			\			1 1
2.00"	50.00	100%	100%	100.0%	0.0%		70%			1			70.0%
1.75"	45.00		98%	100.0%	0.0%		!			1			1 1
1.50"	37.50		95%	100.0%	0.0%		!						
1.25"	31.50		93%	100.0%	0.0%		60%			1 11111111			60.0%
1.00"	25.00	91%	91%	100.0%	0.0%	D.	<u> </u>			\			1 1 1
3/4"	19.00	91%	91%	100.0%	0.0%	% Passing	50%						50.0%
5/8"	16.00		90%	100.0%	0.0%	96	30,0			<u> </u>			30.0% b
1/2"	12.50	90%	90%	100.0%	0.0%		F			ĬIIIIIII			1 1
3/8"	9.50	90%	90%	100.0%	0.0%		40%						40.0%
1/4"	6.30		89%	100.0%	0.0%		F			VIIII			1 1
#4	4.75	89%	89%	100.0%	0.0%		t I			N			1 1
#8	2.36		83%	100.0%	0.0%		30%				+		30.0%
#10	2.00	83%	83%	100.0%	0.0%		t I			IN III			1 1
#16	1.18		46%	100.0%	0.0%		20%			IIN			20.0%
#20	0.850	32%	32%	100.0%	0.0%		20,0						20.0%
#30	0.600		16%	100.0%	0.0%		F			1111			1 1
#40	0.425	6%	6%	100.0%	0.0%		10%						10.0%
#50	0.300		4%	100.0%	0.0%		11						1 1
#60	0.250	3%	3%	100.0%	0.0%		11						
#80	0.180		3%	100.0%	0.0%		0%	100.000	10,000	1.000	0.100	0.010	0.0%
#100	0.150	3%	3%	100.0%	0.0%								
#140	0.106		2%	100.0%	0.0%				Particle Size (r	mm)			
#170	0.090		2%	100.0%	0.0%								
#200	0.075	1.5%	1.5%	100.0%	0.0%		+ Sieve Sizes		Max Specs	Min	Specs -	Sieve Resul	ults

Comments: Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

#100

#140

#170

#200

0.150

0.106

0.090

0.075

79.2%

Source: LDW21-GT44-GB-28.7-30 ft Sample#: B21-2061

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 8-Oct-21 Tested By: A. Eifrig Visual Identification

mm

Sandy Silt Sample Color: brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

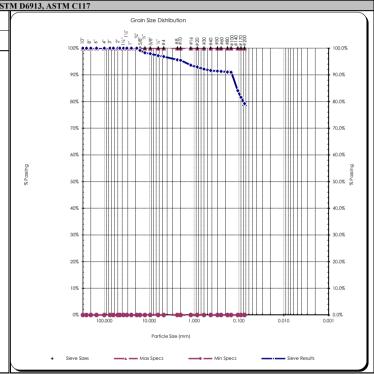
 $D_{(5)} = 0.005$ $D_{(10)} = 0.009$ $D_{(15)} = 0.014$ mm % Gravel = 3.2% % Sand = 17.6% mm % Silt & Clay = 79.2% mm $D_{(30)} = 0.028$ mm Liquid Limit = n/a $D_{(50)} = 0.047$ mm Plasticity Index = n/a $D_{(60)} = 0.057$ mm Sand Equivalent = n/a $D_{(90)} = 0.144$ Dust Ratio = 51/59

Fracture %, 1 Face = n/a Fracture %, 2+ Faces = n/a

Coeff. of Curvature, $C_C = 1.50$ Coeff. of Uniformity, $C_U = 6.00$ Fineness Modulus = 0.41

Plastic Limit = n/a Moisture %, as sampled = 37.0% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

		Actual	Interpolated	AS	TM C136,
			Cumulative		
Sieve Size		Percent	Percent	Specs	Specs
US	Metric	Passing	Passing	Max	Min
12.00"	300.00	-	100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		99%	100.0%	0.0%
1/2"	12.50	98%	98%	100.0%	0.0%
3/8"	9.50	98%	98%	100.0%	0.0%
1/4"	6.30		97%	100.0%	0.0%
#4	4.75	97%	97%	100.0%	0.0%
#8	2.36		96%	100.0%	0.0%
#10	2.00	95%	95%	100.0%	0.0%
#16	1.18		94%	100.0%	0.0%
#20	0.850	93%	93%	100.0%	0.0%
#30	0.600		92%	100.0%	0.0%
#40	0.425	92%	92%	100.0%	0.0%
#50	0.300		91%	100.0%	0.0%
#60	0.250	91%	91%	100.0%	0.0%
#80	0.180		91%	100.0%	0.0%
	1		1	l .	1



0.0%

0.0%

0.0%

0.0%

Comments: Reviewed by: Meghan Blodgett-Carrillo

91%

84%

82%

79.2%

100.0%

100.0%

100.0%

100.0%

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-2065
Sample Date:	8/5/2021
Test Date:	10/15/2021
Technician:	M. Carrillo

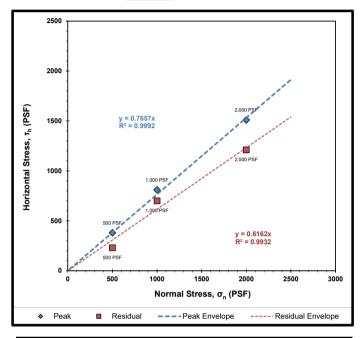
Sample Source: LDW21-GT48-GB-5-10 ft
Visual Soil Description: brown silty sand with gravel
Type of Specimen: Remolded Cylindrical Shear Box
Specimen Diameter (in): 2.5

Summary of Sample	Data:	σ _n =500 PSF						
Initial Moisture Content (%):	37.5							
	Initial	Post-Consolidation						
Dry Density (PCF):	-4530.4	-4603.6						
Void Ratio:	-1.037	-1.037						
Porosity (%):	2789.0	2832.4						
Degree of Saturation (%):	-97.6	saturated						

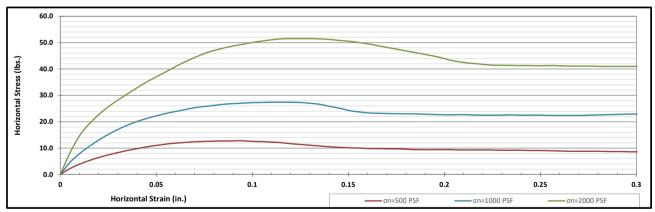
Summary of Sample	Data:	σ _n =1000 PSF
Initial Moisture Content (%):	34.3	
	Initial	Post-Consolidation
Dry Density (PCF):	100.8	104.7
Void Ratio:	0.672	0.610
Porosity (%):	40.2	37.9
Degree of Saturation (%):	saturated	saturated

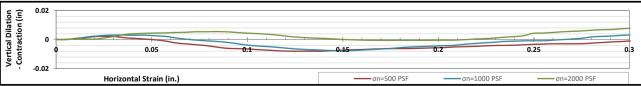
Summary of Samp	le Data:	σ _n =2000 PSF
Initial Moisture Content (%):	35.3	
	Initial	Post-Consolidation
Dry Density (PCF):	100.6	106.4
Void Ratio:	0.675	0.584
Porosity (%):	40.3	36.9
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS									
	PEAK	RESIDUAL							
Angle of Internal Friction, φ (°):	37	32							
Cohesion (PSF):	0	0							



Failure Envelope Test Values:											
Normal Stress, σ _n (PSF):	500	1000	2000								
Peak Horizontal Stress, τ _h (PSF):	380	810	1510								
Residual Horizontal Stress, τ _h (PSF):	230	700	1210								





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

#80

#100

#140

#170

#200

Reviewed by:

0.180

0.150

0.106

0.090

0.075

Meghan Blodgett-Carrillo

Source: LDW21-GT48-GB-0-5 ft **Sample#:** B21-2063

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 8-Oct-21

Date Tested: 8-Oct-21
Tested By: A. Eifrig

ed: 8-Oct-21 Sampl

: A. Eifrig bro

Unified Soils Classification System, ASTM D-2487

SP, Poorly graded Sand

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

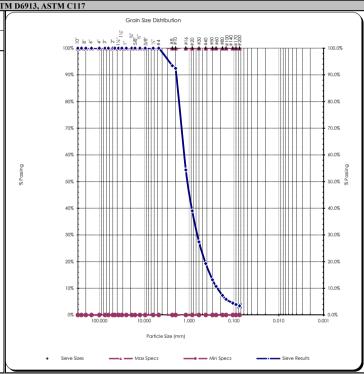
Sample Meets Specs ? N/A

 $D_{(90)} = 1.947$ mm Fracture %, 1 Face = n/a Oust Ratio = 7/39 Fracture %, 2+ Faces = n/a Coeff. of Curvature, $C_C = 1.41$ Coeff. of Uniformity, $C_U = 5.55$

Fineness Modulus = 3.06 Plastic Limit = n/a Moisture %, as sampled = 22.2% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

					Dι
		Actual	Interpolated	AS	TM C136, AST
			Cumulative		
Sieve	Sizo	Percent	Percent	Specs	Specs
US	Metric	Passing	Passing	Max	Min
12.00"	300.00	rassing	100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
		100%			
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		93%	100.0%	0.0%
#10	2.00	92%	92%	100.0%	0.0%
#16	1.18		54%	100.0%	0.0%
#20	0.850		39%	100.0%	0.0%
#30	0.600		27%	100.0%	0.0%
#40	0.425	19%	19%	100.0%	0.0%
#50	0.300		13%	100.0%	0.0%
#60	0.250		11%	100.0%	0.0%



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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT48-GB-5-10 ft Sample#: B21-2065

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 8-Oct-21 Tested By: A. Eifrig

Unified Soils Classification System, ASTM D-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Meghan Blodgett-Carrillo

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D43} \\ \textbf{D}_{(5)} = 0.026 \\ \textbf{D}_{(10)} = 0.051 \\ \textbf{D}_{(15)} = 0.076 \\ \textbf{D}_{(30)} = 0.102 \\ \textbf{D}_{(50)} = 0.137 \\ \textbf{D}_{(60)} = 0.171 \\ \textbf{D}_{(90)} = 0.386 \\ \textbf{Partice} = 15/98 \end{array}$ mm % Gravel = 0.7% % Sand = 84.7% mm % Silt & Clay = 14.6% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a

mm Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 1.19$ Coeff. of Uniformity, $C_U = 3.32$ Fineness Modulus = 0.75

Plastic Limit = n/a Moisture %, as sampled = 39.5% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face =

				1.0		st Ratio = 15/98			Fra	cture 9	6, 2+ I	aces =	n/a		R	eq'd I	ractui	re %, 2	2+ Fac	ces =
		Actual	Interpolated	AS	TM C136, AST	M D6913, ASTM	C117													
		Cumulative				ľ				Grain Si	ze Distrib	ution								
Sieve	Sizo	Percent	Percent	Specs	Specs				54	Ę. :										
US	Metric	Passing	Passing	Max	Min		je je		0 2 ≥ 3	. 58.	2 × #	## #	838	2228	## ## 84 KX					
12.00"	300.00	rassing	100%	100.0%	0.0%	1	100%		• (0.0	• • • • • • • • • • • • • • • • • • • •	TO TO		**	***	* ***	TTTT	T	ППП	TT	100.0%
10.00"	250.00		100%	100.0%	0.0%								***							1
8.00"	200.00		100%	100.0%	0.0%		90%													90.0%
6.00"	150.00		100%	100.0%	0.0%		1							\						1
4.00"	100.00		100%	100.0%	0.0%		ŀ							1						1
3.00"	75.00		100%	100.0%	0.0%		80%			-				++-		₩₩	-			80.0%
2.50"	63.00		100%	100.0%	0.0%									i						1
2.00"	50.00	100%	100%	100.0%	0.0%									ľ						1
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1.25"	31.50		100%	100.0%	0.0%		60%													60.0%
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3/4"	19.00	100%	100%	100.0%		% Passing	-								\					- ig
		100%			0.0%	% O	50%			-		-	₩₩	+++	₩		-		-	50.0% B
5/8"	16.00	1000/	100%	100.0%	0.0%										1					1
1/2"	12.50	100%	100%	100.0%	0.0%										1					1
3/8"	9.50	99%	99%	100.0%	0.0%		40%				mm		mm	ttt	1111	m				40.0%
1/4"	6.30	000/	99%	100.0%	0.0%		t													1
#4	4.75	99%	99%	100.0%	0.0%		30%						ШШ							30.0%
#8	2.36	000/	99%	100.0%	0.0%		-								M					1 00.000
#10	2.00	99%	99%	100.0%	0.0%		F													1
#16	1.18		97%	100.0%	0.0%		20%		HHH	-			₩₩	┼┼┼		₩₩				20.0%
#20	0.850		96%	100.0%	0.0%										Ĭ					1
#30	0.600		96%	100.0%	0.0%		-								lî.					1
#40	0.425	95%	95%	100.0%	0.0%		10%	-	HHH		HHH		11111	+++	-#	†††	_			10.0%
#50	0.300		78%	100.0%	0.0%															1
#60	0.250		71%	100.0%	0.0%		0%		ЩЦ		ШЦ	Щ.	Щ	U.L						0.0%
#80	0.180		61%	100.0%	0.0%		0,0	100.00)	10.0	00	1.	000	-	0.100		0.01	10		0.001
#100	0.150	57%	57%	100.0%	0.0%						D 17 1 67									
#140	0.106		32%	100.0%	0.0%						Particle Si	ze (mm)								
#170	0.090		23%	100.0%	0.0%															
#200	0.075	14.6%	14.6%	100.0%	0.0%	+ Si	ieve Sizes			- Max	Specs	-		Min Spe	ecs .	-		Sieve Re	esults	
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Comments:	
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	Mayb Gladget Soil lo
Reviewed by:	



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT48-GB-10-15 ft Sample#: B21-2066

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 8-Oct-21

Tested By: A. Eifrig

Unified Soils Classification System, ASTM D-2487

SM, Silty Sand Sample Color: dark brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Reviewed by:

Meghan Blodgett-Carrillo

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.009 \\ \textbf{D}_{(10)} = 0.056 \\ \textbf{D}_{(15)} = 0.071 \\ \textbf{D}_{(30)} = 0.102 \\ \textbf{D}_{(50)} = 0.141 \\ \textbf{D}_{(60)} = 0.183 \\ \textbf{D}_{(90)} = 0.369 \\ \textbf{Partice} = 8/49 \\ \textbf{Partice} = 8/49 \\ \textbf{D}_{(10)} = 0.009 \\ \textbf{D}_$ mm % Gravel = 0.1% % Sand = 83.7% mm % Silt & Clay = 16.2% mm mm Liquid Limit = n/a Plasticity Index = n/amm mm

Sand Equivalent = n/a Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 1.02$ Coeff. of Uniformity, $C_U = 3.29$ Fineness Modulus = 0.68

Plastic Limit = n/a Moisture %, as sampled = 30.7% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

					Du	st Ratio = 8	/49	F	racture 9	%, 2+ Fa	ces = n/a	ı	Req!	d Fractu	re %, 2+	Faces =	
				AS	TM C136, AST	M D6913, AS	STM C117										
		Actual	Interpolated						Grain S	ize Distribut	tion						$\overline{}$
		Cumulative	Cumulative														
Sieve	e Size	Percent	Percent	Specs	Specs		h:	9 4 6 6		bo =	2 2 2 2	5 8 8 8 8	3558				
US	Metric	Passing	Passing	Max	Min		100%	•-• •• •		or ≥ ≟ = Andokanno		A + + + + + + + + + + + + + + + + + + +				T 100.0%	
12.00"	300.00		100%	100.0%	0.0%							1				1 1	
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8.00"	200.00		100%	100.0%	0.0%		90%					++				90.0%	
6.00"	150.00		100%	100.0%	0.0%											1 1	
4.00"	100.00		100%	100.0%	0.0%		80%									80.0%	
3.00"	75.00		100%	100.0%	0.0%		00%									1 00.0%	
2.50"	63.00		100%	100.0%	0.0%							1				1 1	
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1.75"	45.00		100%	100.0%	0.0%											1 1	
1.50"	37.50		100%	100.0%	0.0%												
1.25"	31.50		100%	100.0%	0.0%		60%		-			 				60.0%	
1.00"	25.00	100%	100%	100.0%	0.0%	Ď.	1									1 1	D.
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	50%									50.0%	Pos
5/8"	16.00		100%	100.0%	0.0%	96	30%									30.0%	96
1/2"	12.50	100%	100%	100.0%	0.0%								\			1	
3/8"	9.50	100%	100%	100.0%	0.0%		40%		_	$\parallel \parallel $		H + H -	1			40.0%	
1/4"	6.30		100%	100.0%	0.0%								1				
#4	4.75	100%	100%	100.0%	0.0%								¥ IIII				
#8	2.36		100%	100.0%	0.0%		30%			####		_	1			30.0%	
#10	2.00	100%	100%	100.0%	0.0%								N. I			1 1	
#16	1.18		99%	100.0%	0.0%		20%						Ĭ			20.0%	
#20	0.850		99%	100.0%	0.0%		20,0						Ĭ.			20.0,0	
#30	0.600		99%	100.0%	0.0%								ıή			1 1	
#40	0.425	99%	99%	100.0%	0.0%		10%									10.0%	
#50	0.300		79%	100.0%	0.0%									*		1 1	
#60	0.250		71%	100.0%	0.0%										*-		
#80	0.180		60%	100.0%	0.0%		0%	100.000	10.0	000	1.000	10-00-0 0	0.100	0.0	10	0.0%	
#100	0.150	55%	55%	100.0%	0.0%				10.					5.0			
#140	0.106		32%	100.0%	0.0%					Particle Size	(mm)						
#170	0.090	1	24%	100.0%	0.0%												
#200	0.075	16.2%	16.2%	100.0%	0.0%	+	Sieve Sizes	_	- Max	Specs		Min Spe	cs		Sieve Result	s	
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Hydrometer Report

Project:	Q.C Lower	Duwamish Wa	terway Date Recei	ved: 29-Jul-21	Unified Soils C	lassification S	ystem, ASTM D-2487
Project #: 1	21B233		Sampled	By: Client	SM, Silty Sand		
•	Anchor QEA			sted: 8-Oct-21	Sample Color		
		8-GB-10-15 ft		By: A. Eifrig	dark brown		
Sample#:		0 02 10 10 11	105000	2 , • • • • • • • • • • • • • • • • • • •	durit orown		
		, HYDROMI	ETER ANALYSI	S		ASTM	1 D6913
Sp Gr :	2.62					Sieve	Analysis
Sample Weight:	100.83	grams				Grain Size	Distribution
Hydroscopic Moist.:	3.02%				Sieve	Percent	Soils Particle
Adj. Sample Wgt :	97.87	grams		ACCREDITED	Size	Passing	Diameter
				Certificate #: 1366.01	3.0"	100%	75.000 mm
Hydrometer					2.0"	100%	50.000 mm
Reading	Corrected	Percent	Soils Particle		1.5"	100%	37.500 mm
Minutes	Reading	Passing	Diameter		1.25"	100%	31.500 mm
1	9	9.3%	0.0533 mm		1.0"	100%	25.000 mm
2	8	8.2%	0.0380 mm		3/4"	100%	19.000 mm
5	7	7.2%	0.0242 mm		5/8"	100%	16.000 mm
15	6.5	6.7%	0.0140 mm		1/2"	100%	12.500 mm
30	5.5	5.7%	0.0100 mm		3/8"	100%	9.500 mm
60	4	4.1%	0.0071 mm		1/4"	100%	6.300 mm
240	2	2.1%	0.0036 mm		#4	100%	4.750 mm
1440	1	1.0%	0.0015 mm		#10	100%	2.000 mm
0/ C1.	0.10/				#20	99%	0.850 mm
% Gravel: % Sand:	0.1%		iquid Limit: n/a		#40	99%	0.425 mm
% Sanu: % Silt:	83.7% 13.3%		Plastic Limit: n/a sticity Index: n/a		#100 #200	55% 16.2%	0.150 mm 0.075 mm
% Clay:	2.9%	r ia:	sucity index: 11/a		Silts	15.9%	0.074 mm
76 Clay.	2.970				Sitts	9.1%	0.050 mm
						7.0%	0.020 mm
					Clays	2.9%	0.005 mm
					Clays	1.3%	0.003 mm
					Colloids	0.7%	0.001 mm
					Conoras	01770	0.001
	USDA S	oil Textural (Classification				
		Particle Size					
% Sand:		2.0 - 0.05 mm					
% Silt:		0.05 - 0.002 mm	1				
% Clay:		< 0.002 mm					
	*****		~				
	USDA S	oil Textural (Classification				
		Sand					
All results apply only to actual location	me and materiale tested	As a mutual protection t	a cliente, the nublic and ourselves	all reports are submitted as the cont	Edantial property of clients	nd authorization for publ	lication of statements, conclusions or extracts from or
regarding our reports is reserved pend			o enema, me puone una ourserves,	an reports are submitted as the con-	ndental property of enems, t	na addioination for paos	or satellies, coreasions or extress from or
Comments:							
Comments.							
	1 0	a. A.11					
	Worth His	Reget and lo					
Reviewed by:		0					
· -	Meghan Blodgett	t-Carrillo					



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT48-GB-15-18.2 ft

Sample#: B21-2067

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 8-Oct-21 Tested By: A. Eifrig Unified Soils Classification System, ASTM D-2487

SP-SM, Poorly graded Sand with Silt

Sample Color: dark brown

mm



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{c} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.070 \\ \textbf{D}_{(10)} = 0.104 \\ \textbf{D}_{(15)} = 0.134 \\ \textbf{D}_{(30)} = 0.194 \\ \textbf{D}_{(50)} = 0.288 \\ \textbf{D}_{(60)} = 0.377 \\ \textbf{D}_{(90)} = 1.510 \\ \textbf{Patic} = 4/49 \\ \end{array}$ mm % Gravel = 0.2% % Sand = 94.4% mm % Silt & Clay = 5.3% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a

Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 0.97$ Coeff. of Uniformity, $C_U = 3.64$ Fineness Modulus = 1.77

Plastic Limit = n/a Moisture %, as sampled = 21.9% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

Sieve Siz US 12.00" 10.00"	Metric 300.00 250.00 200.00		Interpolated Cumulative Percent Passing 100%	Specs Max	TM C136, AST	TM D6913, AST			Grain Size	Distribut	on						
US 12.00" 10.00"	Metric 300.00 250.00 200.00	Cumulative Percent	Cumulative Percent Passing		Specs				Grain Size	Distributi	on						
US 12.00" 10.00"	Metric 300.00 250.00 200.00	Percent	Percent Passing		Specs												
US 12.00" 10.00"	Metric 300.00 250.00 200.00		Passing		Specs				E.								
12.00" 10.00"	300.00 250.00 200.00	Passing		Max			b is	N 94 6		÷ 4 6	2 28 2	9449	8258				
10.00"	250.00 200.00		100%		Min		100%		•	•		1	1111	ПТ		TTTT	T 100.0%
	200.00			100.0%	0.0%					1	ì						. 1
			100%	100.0%	0.0%		1				N IIII						. 1
8.00"			100%	100.0%	0.0%		90%				11111	#####		+++	-	###	90.0%
6.00"	150.00		100%	100.0%	0.0%		t				\						. 1
4.00"	100.00		100%	100.0%	0.0%		80%				L NII						80.0%
3.00"	75.00		100%	100.0%	0.0%		00/8				ì						00.0%
2.50"	63.00		100%	100.0%	0.0%		-				\						. 1
2.00"	50.00	100%	100%	100.0%	0.0%		70%					4444				444-	70.0%
1.75"	45.00		100%	100.0%	0.0%							MII					. 1
1.50"	37.50		100%	100.0%	0.0%		1					1					. 1
1.25"	31.50		100%	100.0%	0.0%		60%					+1				╫╫┾	60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	2	ŀ					11/					
3/4"	19.00	100%	100%	100.0%	0.0%	% Possing											50.0%
5/8"	16.00		100%	100.0%	0.0%	96	50%					111					50.0% 88
1/2"	12.50	100%	100%	100.0%	0.0%		ļ					1111					. 1
3/8"	9.50	100%	100%	100.0%	0.0%		40%					₩.				Ш.	40.0%
1/4"	6.30		100%	100.0%	0.0%		ŀ					 					. 1
#4	4.75	100%	100%	100.0%	0.0%		ł										. 1
#8	2.36		98%	100.0%	0.0%		30%		++						++		30.0%
#10	2.00	98%	98%	100.0%	0.0%		-										. 1
#16	1.18		85%	100.0%	0.0%												. 1
#20	0.850	80%	80%	100.0%	0.0%		20%						•				20.0%
#30	0.600		71%	100.0%	0.0%		1						\				. 1
#40	0.425	65%	65%	100.0%	0.0%		10%						<u> </u>	Ш			10.0%
#50	0.300		51%	100.0%	0.0%								1				
#60	0.250	46%	46%	100.0%	0.0%		ŀ						ı				. 1
#80	0.180		26%	100.0%	0.0%		0%	100.000	100 00 0	والموا	1.000	0 00 0	- 444	шП		шш	0.0%
#100	0.150	18%	18%	100.0%	0.0%			100.000	10.000		1.000		0.100		0.010		0.001
#140	0.106	1070	10%	100.0%	0.0%				Po	article Size	(mm)						
#170	0.090		8%	100.0%	0.0%												
#200	0.075	5.3%	5.3%	100.0%	0.0%		Sieve Sizes	_	▲ — Max Sp	oct		— Min Sp	ec.		Sir	eve Results	
		nical Services PS, 1996-9	ļ	100.070	0.076	,	5,5,5 31263		- Widx sp	003						2+C K830II3	

Comments: Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

#10

#16

#20

#30

#40

#50

#60

#80

#100

#140

#170

#200

2.00

1.18

0.850

0.600

0.425

0.300

0.250

0.180

0.150

0.106

0.090

0.075

Source: LDW21-GT48-GB-18.2-19.5 ft **Sample#:** B21-2068

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 8-Oct-21 Tested By: A. Eifrig Visual Identification Sandy Silt

Sample Color: brown

 $D_{(90)} = 0.242$



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs ? N/A

mm

Sand Equivalent = n/a Fracture %, 1 Face = n/a Fracture %, 2+ Faces = n/a Coeff. of Curvature, $C_C = 1.50$ Coeff. of Uniformity, $C_U = 6.00$ Fineness Modulus = 0.42 Plastic Limit = n/a

Moisture %, as sampled = 30.8% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

i						2 (90)	0.2.2
						ust Ratio =	
			1-	AS	STM C136, AS	ГМ D6913,	ASTM
		Actual	Interpolated				
		Cumulative	Cumulative		·h		
Sieve	e Size	Percent	Percent	Specs	Specs		
US	Metric	Passing	Passing	Max	Min		
12.00"	300.00		100%	100.0%	0.0%	1	
10.00"	250.00		100%	100.0%	0.0%		
8.00"	200.00		100%	100.0%	0.0%		
6.00"	150.00		100%	100.0%	0.0%		
4.00"	100.00		100%	100.0%	0.0%		
3.00"	75.00		100%	100.0%	0.0%		
2.50"	63.00		100%	100.0%	0.0%		
2.00"	50.00	100%	100%	100.0%	0.0%		
1.75"	45.00		100%	100.0%	0.0%		
1.50"	37.50		100%	100.0%	0.0%		
1.25"	31.50		100%	100.0%	0.0%		
1.00"	25.00	100%	100%	100.0%	0.0%	2	
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	
5/8"	16.00		100%	100.0%	0.0%	96	
1/2"	12.50	100%	100%	100.0%	0.0%		
3/8"	9.50	99%	99%	100.0%	0.0%		
1/4"	6.30		98%	100.0%	0.0%		
#4	4.75	98%	98%	100.0%	0.0%		
#8	2.36		97%	100.0%	0.0%		

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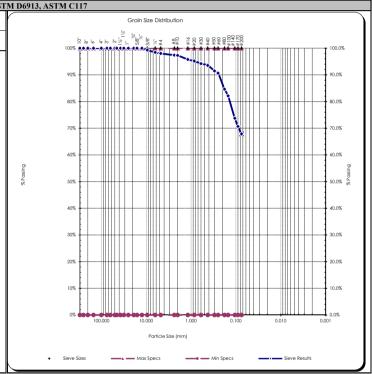
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Meghan Blodgett-Carrillo



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It is usual source for to actual locations and materials is level. As a mutual protection to clients, the oublic and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

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Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Reviewed by:

Meghan Blodgett-Carrillo

Source: LDW21-GT48-GB-20-21.6 ft Sample#: B21-2069

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 8-Oct-21

Tested By: A. Eifrig

SP-SM, Poorly graded Sand with Silt Sample Color:

dark brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{c} D_{(5)} = 0.057 \\ D_{(10)} = 0.087 \\ D_{(10)} = 0.087 \\ D_{(15)} = 0.104 \\ D_{(30)} = 0.153 \\ D_{(50)} = 0.190 \\ D_{(60)} = 0.208 \\ D_{(90)} = 0.329 \\ Dust Ratio = 6/91 \\ \end{array}$ mm % Gravel = 0.0%% Sand = 93.5% mm % Silt & Clay = 6.5% mm mm Liquid Limit = n/a Plasticity Index = n/a mm Sand Equivalent = n/a

Unified Soils Classification System, ASTM D-2487

Coeff. of Curvature, $C_C = 1.29$ Coeff. of Uniformity, $C_U = 2.40$ Fineness Modulus = 0.85 Plastic Limit = n/a Moisture %, as sampled = 31.2% Req'd Sand Equivalent =

Fracture %, 1 Face = n/a
Fracture %, 2+ Faces = n/a mm Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

Dust Ratio = 6/91 Fracture %, 2+ Faces = n/a Req'd Fracture %, 2+ Faces = ASTM C136, ASTM D6913, ASTM C117								
		Actual	Interpolated	Ac	71.11 C130, A3			
		Cumulative	Cumulative			Grain Size Distribution		
Sieve	Size	Percent	Percent	Specs	Specs	5		
US	Metric	Passing	Passing	Max	Min	1000.20		
12.00"	300.00		100%	100.0%	0.0%			
10.00"	250.00		100%	100.0%	0.0%			
8.00"	200.00		100%	100.0%	0.0%	90%		
6.00"	150.00		100%	100.0%	0.0%			
4.00"	100.00		100%	100.0%	0.0%	80.05		
3.00"	75.00		100%	100.0%	0.0%	80.7%		
2.50"	63.00		100%	100.0%	0.0%			
2.00"	50.00	100%	100%	100.0%	0.0%	70%		
1.75"	45.00		100%	100.0%	0.0%			
1.50"	37.50		100%	100.0%	0.0%			
1.25"	31.50		100%	100.0%	0.0%	60.0%		
1.00"	25.00	100%	100%	100.0%	0.0%	prisso Pr		
3/4"	19.00	100%	100%	100.0%	0.0%	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
5/8"	16.00		100%	100.0%	0.0%	be 30/6 1		
1/2"	12.50	100%	100%	100.0%	0.0%			
3/8"	9.50	100%	100%	100.0%	0.0%	40.0%		
1/4"	6.30		100%	100.0%	0.0%			
#4	4.75	100%	100%	100.0%	0.0%			
#8	2.36		100%	100.0%	0.0%	30%		
#10	2.00	100%	100%	100.0%	0.0%			
#16	1.18		100%	100.0%	0.0%	20%		
#20	0.850	100%	100%	100.0%	0.0%			
#30	0.600		99%	100.0%	0.0%			
#40	0.425	99%	99%	100.0%	0.0%	10%		
#50	0.300		87%	100.0%	0.0%			
#60	0.250	83%	83%	100.0%	0.0%			
#80	0.180		45%	100.0%	0.0%	0% 000 0 184 000 0 10.000 1.000 0.100 0.010 0.001		
#100	0.150	28%	28%	100.0%	0.0%			
#140	0.106		16%	100.0%	0.0%	Particle Size (mm)		
#170	0.090		11%	100.0%	0.0%			
#200	0.075	6.5%	6.5%	100.0%	0.0%	+ Sieve Sizes —— Max Specs —— Min Specs —— Sieve Results		
Copyright	Spears Engineering & Tec	hnical Services PS, 1996-9	98					



October 19, 2021 HWA Project No. 2012-002-23 Task 51

Materials Testing & Consulting, Inc.

777 Chrysler Drive Burlington, WA 98233

Attention: Ms. Meghan Blodgett-Carrillo

Subject: LABORATORY TESTING REPORT

QC - Lower Duwamish Waterway MTC Project Number: 21B233

Dear Ms. Blodgett-Carrillo;

In accordance with your request, HWA GeoSciences Inc. (HWA) performed laboratory testing for the above referenced project. Herein we present the results of our laboratory analyses, which are summarized on the attached Figures. The laboratory testing program was performed in general accordance with your instructions and appropriate ASTM Standards as outlined below.

SAMPLE DESCRIPTION: The subject samples were delivered to our laboratory on August 26, 2021 by MTC personnel. The samples were delivered in four Shelby tubes and were designated with exploration ID and depth of sampling. The soil samples were classified using visual-manual methods. The descriptions may be found on the attached Summary of Material Properties, Figure 1.

MOISTURE CONTENT OF SOIL: The moisture contents of the soil samples (percent by dry mass) were determined in general accordance with ASTM D2216. The results are shown on Figure 1.

SPECIFIC GRAVITY OF SOILS: The specific gravity of the selected samples was determined using method ASTM D854. The test results are shown on the attached Summary of Material Properties, Figure 1.

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ATTERBERG LIMITS): The plasticity index of each specified sample was tested using method ASTM D4318, multi-point method. The results are reported on the attached Liquid Limit, Plastic Limit, and Plasticity Index of Soils Report, Figure 2.

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION OF SOILS: Selected samples were tested in general accordance with method ASTM D4767 to determine the shear strength characteristics of the soil. The samples were extruded from Shelby tubes, and the test specimens were trimmed to obtain a cylindrical test sample with a length to diameter ratio between 2:1 and 2.5:1. The specimens were carefully weighed and measured prior to testing.

Three trials were run at varying confining stresses specified by the client. Each sample was run using a single specimen to perform a multi-stage shear test.

The multi-stage method was performed by first consolidating the sample at the lowest specified confining pressure. The sample was then sheared until the change in pore pressure was at or near its estimated peak. After reaching the peak change in pore pressure, the shear phase was terminated, and the specimen was reconsolidated at the middle consolidation pressure. Under the second consolidation pressure the sample was again sheared until the change in pore pressure was at or near its estimated peak, at which point the shear was terminated. The sample was reconsolidated a third and final time under the highest confining pressure and shearing was performed to sample failure, concluding the test.

For sample LDW21-GT33-GB at 6.0-8.0', the test was terminated at 20.5% strain due to a spike in pore pressure caused by a perforation in the membrane encasing the sample. As a result, the final moisture content of the sample was affected due to the ingress of water from the surrounding water filled pressure cell. The final moisture content for this sample was determined to be 70.7%.

The Consolidated Undrained test results are summarized and plotted graphically in Figures 3-6.

ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL: The consolidation properties of selected soil samples were measured in general accordance with ASTM D 2435. Saturation was maintained by inundation of the sample throughout the test. The samples were subjected to increasing increments of total stress, the duration of which was selected to exceed the time required for completion of primary consolidation as defined in the Standard, Method B. Unloading of the sample was carried out incrementally. The primary compression test results are presented on the attached Consolidation Test Reports, Figures 7-10.



CLOSURE: Experience has shown that test values on soil and other natural materials vary with each representative sample. As such, HWA has no knowledge as to the extent and quantity of material the tested samples may represent. HWA also makes no warranty as to how representative either the samples tested or the test results obtained are to actual field conditions. It is a well-established fact that sampling methods present varying degrees of disturbance that affect sample representativeness.

No copy should be made of this report except in its entirety.

We appreciate the opportunity to provide laboratory testing services on this project. Should you have any questions or comments, or if we may be of further service, please call.

Sincerely,

HWA GEOSCIENCES INC.

Greg Barker

Materials Laboratory Supervisor

Steven E. Greene, L.G., L.E.G. Principal Engineering Geologist

Vice President

Attachments:

Figure 1

Summary of Material Properties

Figure 2

Liquid Limit, Plastic Limit and Plasticity Index of Soils

Figures 3-6

Consolidated Undrained Triaxial Compression Test for Cohesive Soils

Figures 7-10

Consolidation Test Report

		E			VITY	ATTERBERG LIMITS (%)				1						
EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPT (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVI	LL	PL	PI	% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION			
LDW21-GT23-GB,	28.5	30.5	33.3		2.617	26	25	1				SM	Dark grayish-brown, silty SAND			
LDW21-GT33-GB,	6.0	8.0	58.6		2.612	38	36	2				ML	Very dark grayish-brown, SILT with sand			
LDW21-GT33-GB,	21.0	23.0	35.3		2.643	31	29	2				SM	Very dark grayish-brown, silty SAND			
LDW21-GT53-SPT,	30.0	32.0	43.6		2.627	38	27	11				ML	Very dark grayish-brown, SILT with sand			

Notes:

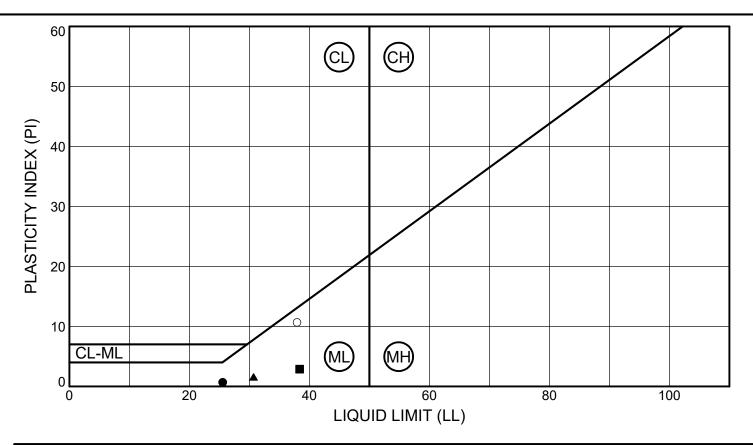
- 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.
- 2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.



MLT for MTC, Inc. QC - Lower Duwamish Waterway Client Project No.: 21B233 SUMMARY OF MATERIAL PROPERTIES

PAGE: 1 of 1

PROJECT NO.: 2012-002 T51 FIGURE: 1



SYMBOL	SAMPLE	DEPTH (ft)	CLASSIFICATION		LL	PL	PI	% Fines
•	LDW21-GT23-GB	28.5 - 30.5	(SM) Dark grayish-brown, silty SAND	33	26	25	1	
-	LDW21-GT33-GB	6.0 - 8.0	(ML) Very dark grayish-brown, SILT with sand	59	38	36	2	
A	LDW21-GT33-GB	21.0 - 23.0	(SM) Very dark grayish-brown, silty SAND	35	31	29	2	
0	LDW21-GT53-SPT	30.0 - 32.0	(ML) Very dark grayish-brown, SILT with sand	44	38	27	11	

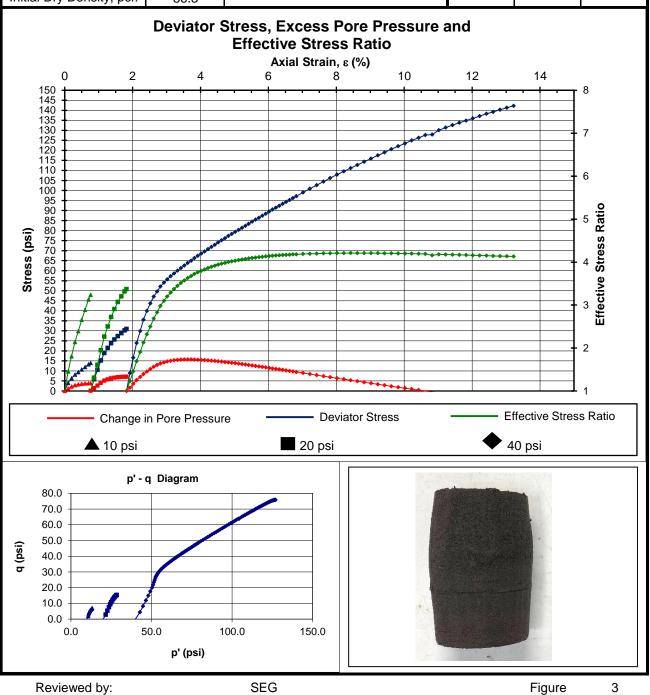


MLT for MTC, Inc. QC - Lower Duwamish Waterway Client Project No.: 21B233 LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS METHOD ASTM D4318

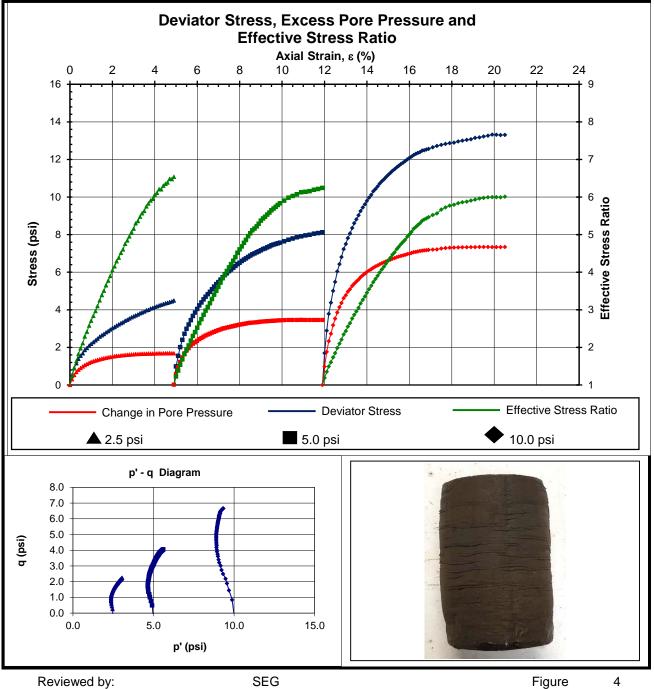
PROJECT NO.: 2012-002 T51 FIGU

FIGURE: 2

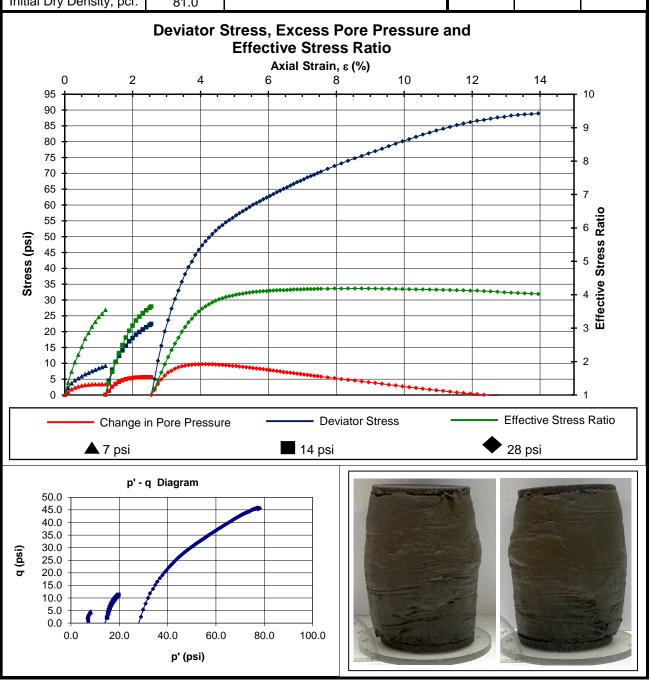
	HWA Geo	Sciences Inc	- Materials T	esting Labo	oratory			
Consolidated-Undrained Triaxial Compression Test for Cohesive Soils (ASTM D 4767)								
Project Name: Lower Duwamish Waterway Date: 8/27/2021							/2021	
Project No.:	2012-00	2-23 T51	23 T51 Exploration ID: LDW21-GT2					
Technician:	D'	DW Sample No: r					n/a	
Sample Description:	Dark (grayish-brown, silty SAND (SM) Sample Depth, ft:				Depth, ft:	28.5-30.5'	
Confining Pressures:	10 psi	20 psi	40 psi		Consolidat	tion T50 Value	s (minutes)	
Initial Moisture:	33.4%	Final M	loisture:	32.4%	10 psi	20 psi	40 psi	
Initial Wet Density, pcf:	115.2			·	0.6	0.6	1.0	
Initial Dry Density, pcf:	86.3				0.6	0.6	1.0	



	HWA GeoSciences Inc - Materials Testing Laboratory								
Consolidated-Undrained Triaxial Compression Test for Cohesive Soils (ASTM D 4767)									
Project Name: Lower Duwamish Waterway Date: 8/28/2021							2021		
Project No.:	2012-00	2-23 T51	E>	cploration ID	:	LDW21-0	GT33-GB		
Technician:	G	GB Sample No: n/a							
Sample Description:	Very dark	grayish-brown, SILT with sand (ML) Sample Depth, ft:				Depth, ft:	6.0 - 8.0		
Confining Pressures:	2.5 psi	5.0 psi	10.0 psi		Consolidat	ion T50 Values	s (minutes)		
Initial Moisture:	64.8%	Final M	loisture:	see report	2.5 psi	5.0 psi	10.0 psi		
Initial Wet Density, pcf:	93.4				04.42	02.24	162.0		
Initial Dry Density, pcf:	56.7				91.13	83.21	162.0		

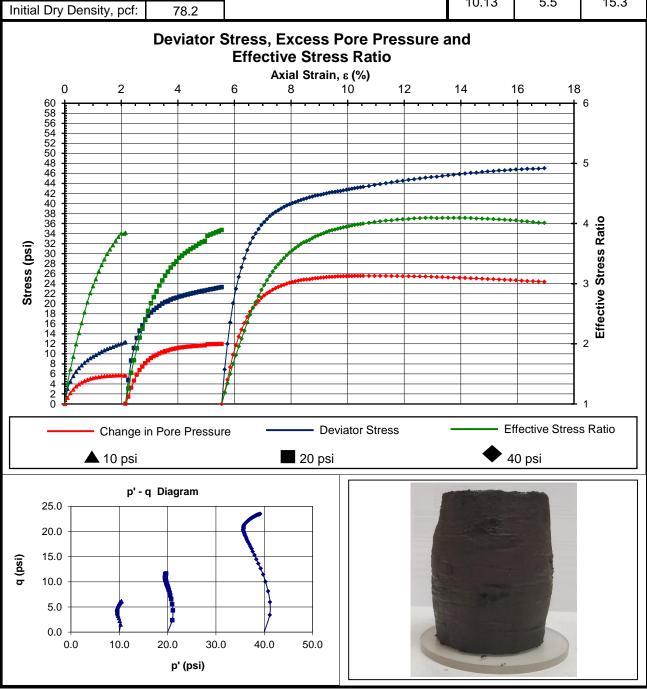


	HWA GeoSciences Inc - Materials Testing Laboratory								
Consolidated-Undrained Triaxial Compression Test for Cohesive Soils (ASTM D 4767)									
Project Name: Lower Duwamish Waterway Date: 9/7/2021							2021		
Project No.:	2012-00	2-23 T51	Ex	ploration ID	:	LDW21-0	GT33-GB		
Technician:	G	В	B Sample No: n/a						
Sample Description:	Very daı	k grayish-bro	grayish-brown, silty SAND (SM) Sample Depth, f						
Confining Pressures:	7 psi	14 psi	28 psi		Consolidat	tion T50 Value	s (minutes)		
Initial Moisture:	35.3%	Final M	loisture:	34.7%	7 psi	14 psi	28 psi		
Initial Wet Density, pcf:	109.6			·	111 E	22.0	0.2		
Initial Dry Density, pcf:	81.0				144.5	23.8	0.3		



Reviewed by: SEG Figure 5

	HWA GeoSciences Inc - Materials Testing Laboratory								
Consolidated-Undrained Triaxial Compression Test for Cohesive Soils (ASTM D 4767)									
Project Name: Lower Duwamish Waterway Date: 9/16/2021						/2021			
Project No.:	2012-00	2-23 T51	E>	cploration ID	:	LDW21-0	ST53-SPT		
Technician:	G	В			n	n/a			
Sample Description:	Very dark	grayish-brow	n, SILT with s	and (ML)	Sample	Depth, ft:	30.0-32.0		
Confining Pressures:	10 psi	20 psi	40 psi		Consolidat	solidation T50 Values (min			
Initial Moisture:	43.6%	Final M	loisture:	36.3%	10 psi	20 psi	40 psi		
Initial Wet Density, pcf:	112.3			·	10.12	<i>E E</i>	45.2		
Initial Dry Density, pcf:	78.2				10.13	5.5	15.3		

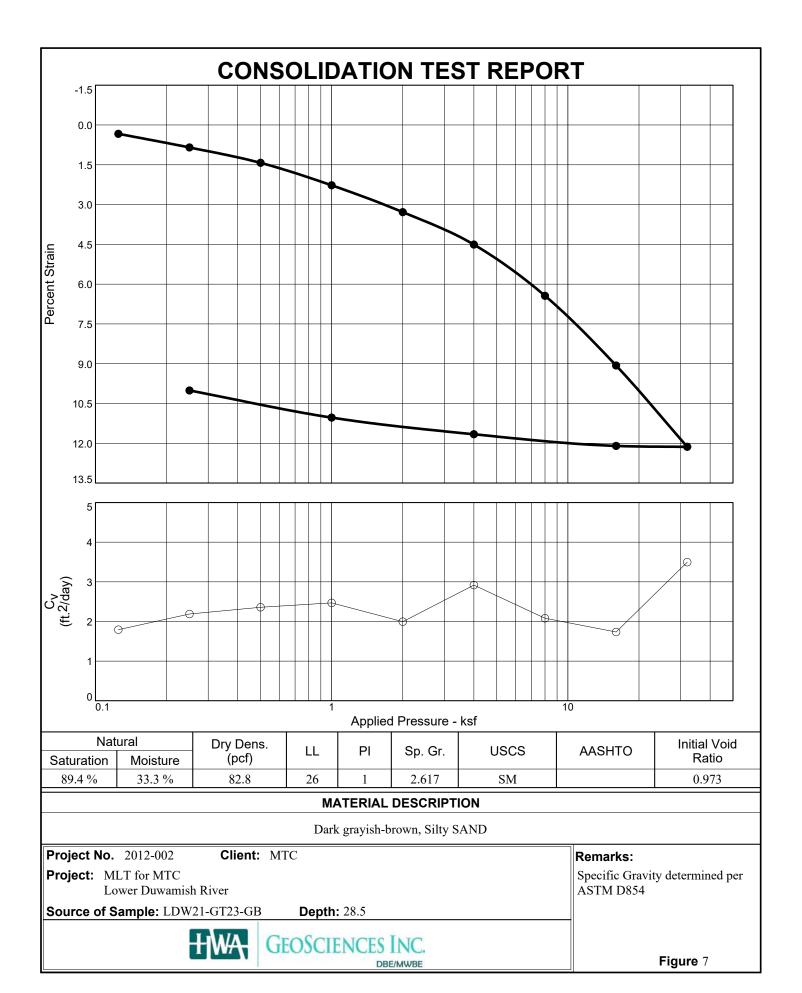


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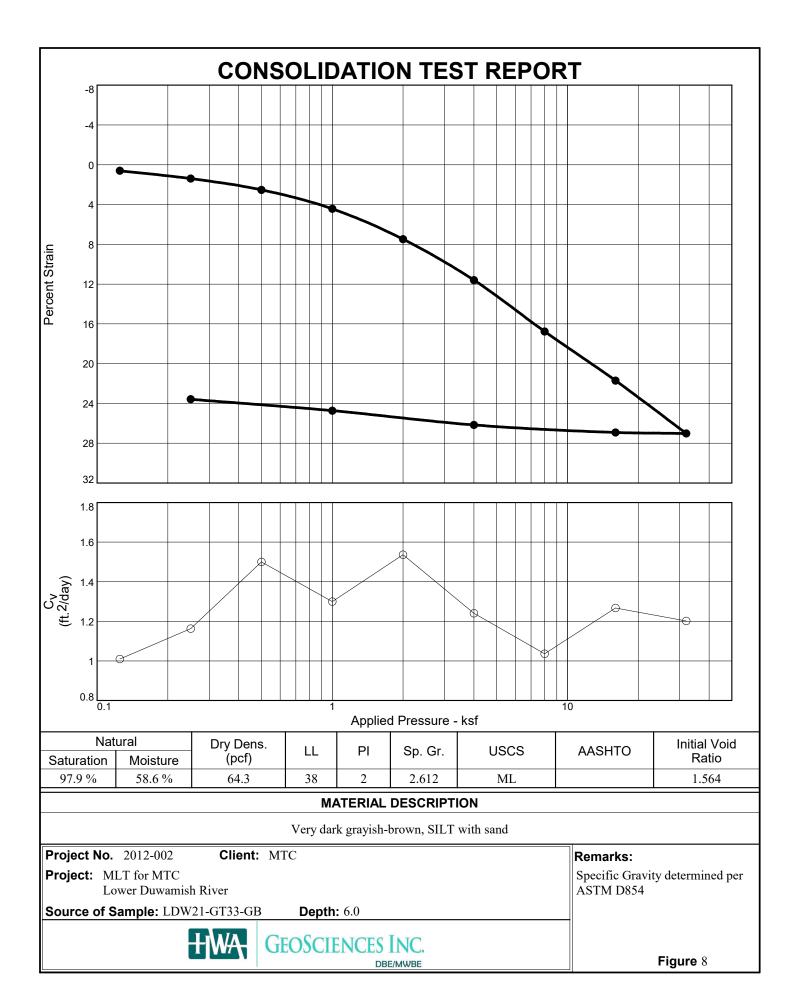
Figure

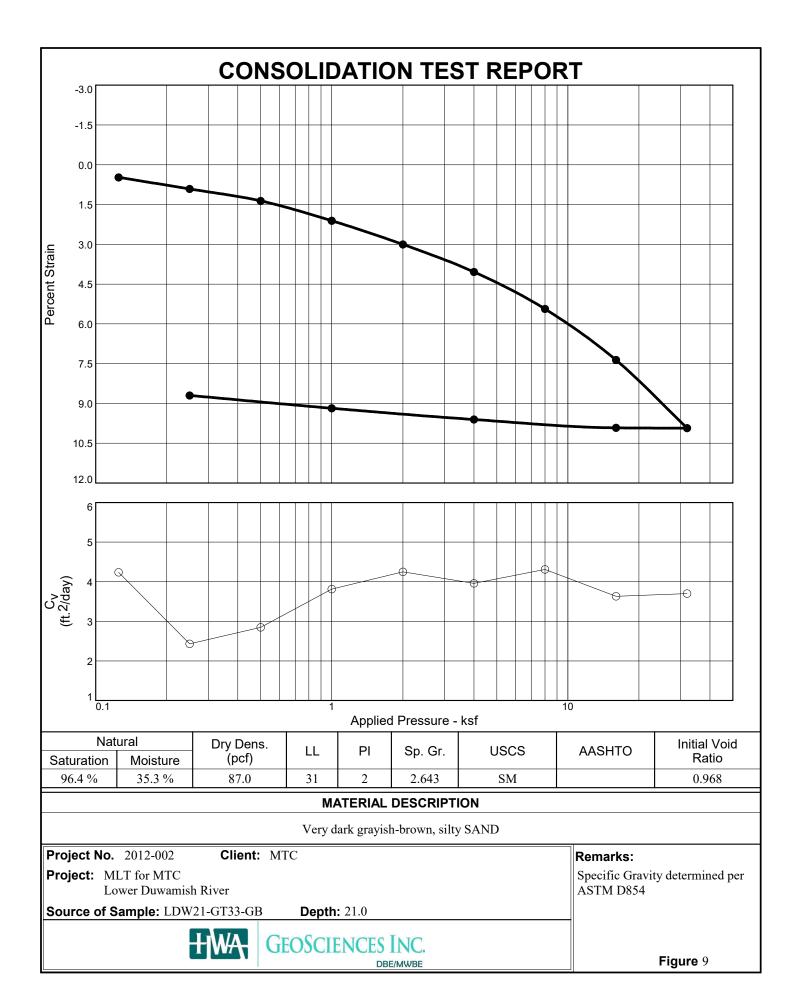
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Reviewed by:

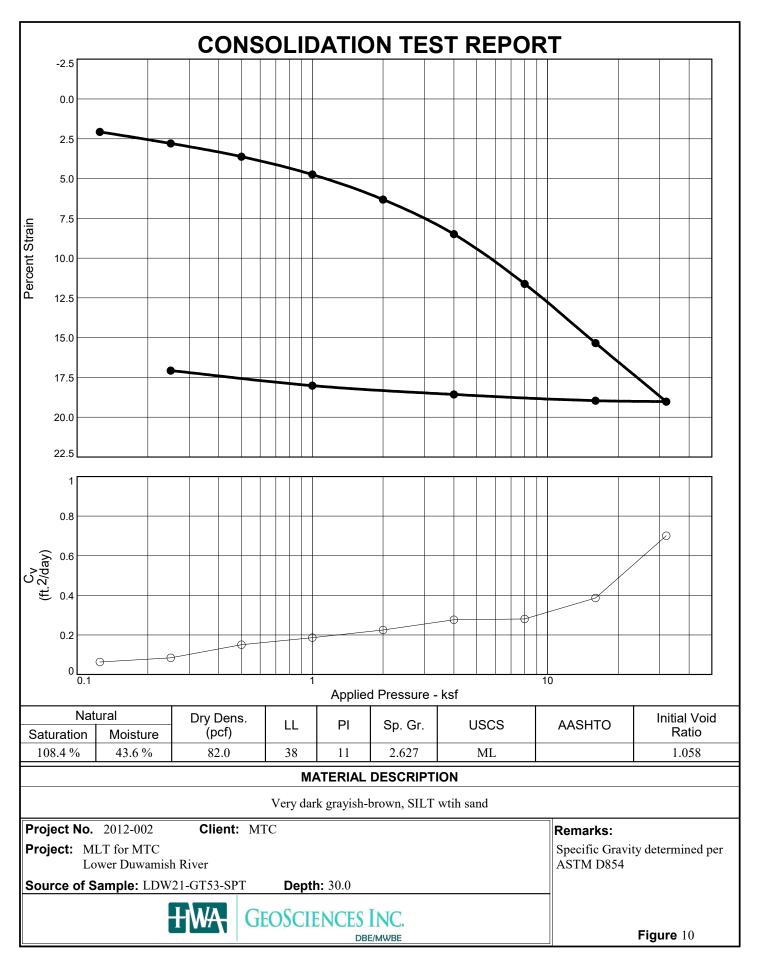


Tested By: AH/GB Checked By: SEG





Tested By: GB Checked By: SEG



Tested By: GB Checked By: SEG



Client:	Anchor QEA	Date:	October 22, 2021
Address:	21328 2nd Drive SE	Project:	Q.C Lower Duwamish Waterway
	Bothell, WA 98021	Project #:	21B233
Attn:	Garrett Timm	Sample #:	B21-2006 - 2020
Revised on:		Date sampled:	7-19-21 & 7-20-21

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	Please See Attached Reports		Sulfate Soundness	
	Proctor	-		Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count			LA Abrasion	
X	Moisture Content	Please See Attached Report	X	Direct Shear	Please See Attached Reports
	Specific Gravity, Coarse		X	Specific Gravity, Soils	Please See Attached Reports
	Specific Gravity, Fine				
X	Hydrometer Analysis	Please See Attached Reports			
X	Atterberg Limits	Please See Attached Reports			
	_				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted, Meghan Blodgett-Carrillo

WABO Supervising Laboratory Technician



Moisture Content - ASTM C566, ASTM D2216

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: October 5, 2021	Tested by: M. Carrillo

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B21-2006	LDW21-GT5-0-1.5 ft	233.4	758.3	626.0	132.3	392.6	33.7%
B21-2007	LDW21-GT5-0-7.5 ft	266.3	675.6	572.3	103.3	306.0	33.8%
B21-2008	LDW21-GT5-7.5-9 ft	270.2	918.2	773.3	144.9	503.1	28.8%
B21-2009	LDW21-GT5-7.5-17.2ft	215.7	960.7	862.1	98.6	646.4	15.3%
B21-2010	LDW21-GT5-17.2-17.5 ft	300.9	721.1	625.3	95.8	324.4	29.5%
B21-2011	LDW21-GT5-17.5-19 ft	346.3	836.3	746.0	90.3	399.7	22.6%
B21-2012	LDW21-GT5-17.5-27.5 ft	341.8	961.5	816.3	145.2	474.5	30.6%
B21-2013	LDW21-GT5-27.5-29 ft	356.9	833.5	719.1	114.4	362.2	31.6%
B21-2014	LDW21-GT35-0-1.5 ft	360.3	821.8	607.9	213.9	247.6	86.4%
B21-2015	LDW21-GT35-5-6.5 ft	354.1	572.7	469.6	103.1	115.5	89.3%
B21-2016	LDW21-GT35-10-11.5 ft	359.4	882.4	671.2	211.2	311.8	67.7%
B21-2017	LDW21-GT35-15-16.5 ft	236.6	466.5	417.1	49.4	180.5	27.4%
B21-2018	LDW21-GT35-20-21.5 ft	237.4	947.7	793.9	153.8	556.5	27.6%
B21-2019	LDW21-GT35-25-26.5 ft	224.2	733.1	614.5	118.6	390.3	30.4%
B21-2020	LDW21-GT35-30-31.5 ft	225.1	669.4	560.4	109.0	335.3	32.5%

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is

Reviewed by:

Meghan Blodgett-Carrillo



Moisture Content - ASTM D854

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: October 5, 2021	Tested by: A. Eifrig

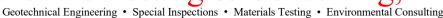
Ī	I	Ī	I	Ī]		Ī	Ī	Mass of	l	1	I	I	1 1
									Pycno filled	Mass of	Temp. of		Temp.	
			Dry Soil +	Mass of Dry		Mass of	Volume of	Density of	w/ water &	Pycno filled	Water, 0.1	SpG of		Corrected
Sample #	Location	Tare	Tare	Soil	Pycno ID	Pycno	Pycno	Water @ Tx	soils	w/ water	*C	Soils	Factor	SpG
B21-2009	LDW21-GT5-7.5-17.2ft	601.79	703.81	102.0	TSA-022	198.0	499.5	0.99865	760.54	696.77	17.7	2.6674865	1.00045	2.6686868
B21-2012	LDW21-GT5-17.5-27.5 ft	497.70	600.26	102.6	TSA-021	183.4	499.4	0.99869	744.61	682.18	17.6	2.5559632	1.00048	
B21-2017	LDW21-GT35-15-16.5 ft	509.68	611.88	102.2	TSA-023	163.9	498.7	0.99865	724.72	661.99		2.5895248		2.5906901
		<u> </u>												
				-										
		-							-					-
		1												
		1		1			1	1	1					

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:

Meghan Blodgett-Carrillo

Materials Testing & Consulting, Inc. Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting





ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

P	Project: Q.C Lower Duw roject #: 21B233 Client: Anchor QEA Source: LDW21-GT5-GB- ample #: B21-2007	•	Date Received Sampled By Date Tested Tested By	: Client	Sand wi	l Identification with Silt le Color	
	ample #: B21-2007						
			nit Determination				
		#1	#2 #3	#4	#5 #6	#6	
	Weight of Wet Soils + Pan:	** ***					
	Weight of Dry Soils + Pan:	Liquid li	mit cannot be established				
	Weight of Pan: Weight of Dry Soils:					Liquid Limit @ 25 Blows:	N/A
	Weight of Moisture:					Plastic Limit:	N/A
	% Moisture:					Plasticity Index, I _P :	N/A
	Number of Blows:						
		Plastic Lin	nit Determination				
		#1	#2 #3	#4	#5 #6	#6	
	Weight of Wet Soils + Pan:						
	Weight of Dry Soils + Pan: Weight of Pan:	Plastic lir	nit cannot be determined				
	Weight of Dry Soils:					ACCREDITED	
	Weight of Moisture:					Certificate #: 1366.01, 1366.02 & 1366.04	
	% Moisture:						
	70 % T	Plas	ticity Chart			Liquid Limit	
	70 % [100% E	
	60 %			Un Line	" Lipe	90%	
	50 %			U all	MAN LIKE	80%	
ĕ				HorOH		70%	
Pu	40 %		9			W 60%	
city	30 %					0 × 50%	
Plasticity Index		OL OL				40%	
₫	20 %	CLorOL		ЛН or OH		30%	
	10 %					20%	
	0 % CL-MI	ML or OL				10%	
		20% 30% 40%	50% 60% 70%	6 80%	90% 100%	110% 0%	100
l		Li	quid Limit			Number of Blows, "N"	100
_	Copyright Spears Engineering & Tech	nical Services PS, 1996-98					

Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the liquid limit device without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumblind. Non-plastic.

Reviewed by: Meghan Blodgett-Carrillo

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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT5-GB-7.5-17.2 ft

Sample#: B21-2009

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 6-Oct-21

Tested By: K. Mendez

SW-SM, Well-graded Sand with Silt and Gravel Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications	
No Specs	

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASTM D431} \\ D_{(5)} = 0.034 \\ D_{(10)} = 0.068 \\ D_{(15)} = 0.162 \\ D_{(30)} = 0.370 \\ D_{(50)} = 0.801 \\ D_{(60)} = 1.580 \\ D_{(90)} = 12.641 \end{array}$ mm % Gravel = 24.4% % Sand = 64.6% mm % Silt & Clay = 11.0% mm mm Liquid Limit = n/a Plasticity Index = n/a mm Sand Equivalent = n/a Fracture %, 1 Face = n/a mm

Unified Soil Classification System, ASTM-2487

Coeff. of Curvature, $C_C = 1.27$ Coeff. of Uniformity, $C_U = 23.13$ Fineness Modulus = 3.41

Plastic Limit = n/a Moisture %, as sampled = 15.3% Req'd Sand Equivalent =
Req'd Fracture %, 1 Face =

					D	$D_{(90)} = 12.641$ ust Ratio = 23/72	nm Fi	racture %, 1				l Fracture racture %		
				AS		TM D6913, ASTM C1		acture 70, 21	Taces - II/a	a	Requir	racture 70	, z i rac	CS —
		Actual	Interpolated		7111 0100,115	V	1,	Grain Size Distr	ibution					
		Cumulative	Cumulative					Grain size Disir	IDUIIOII					
Sieve	Size	Percent	Percent	Specs	Specs		2 99 9 4 99 97	3/8, 7, 17, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,	82 2 2 2 8 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	4 8 8 8 8 8 8 8 E	8			
US	Metric	Passing	Passing	Max	Min		**************************************	· · · · · · · · · · · · · · · · · · ·	** ***	* * * * * * * *	<u>.</u>			T 100.0%
12.00"	300.00		100%	100.0%	0.0%			🚶						1
10.00"	250.00		100%	100.0%	0.0%									1
8.00"	200.00		100%	100.0%	0.0%	90%		 \			-			90.0%
6.00"	150.00		100%	100.0%	0.0%		t IIIIIIII							ł
4.00"	100.00		100%	100.0%	0.0%	80%	<u> </u>	N						80.0%
3.00"	75.00		100%	100.0%	0.0%	0076	-	N.						T 80.0%
2.50"	63.00		100%	100.0%	0.0%									1
2.00"	50.00	100%	100%	100.0%	0.0%	70%			\				-	70.0%
1.75"	45.00		100%	100.0%	0.0%				N IIII					1
1.50"	37.50		100%	100.0%	0.0%				1					1
1.25"	31.50		100%	100.0%	0.0%	60%			++		╫╫┼			60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	<u>p</u>	-		\ \					50.0%
3/4"	19.00	96%	96%	100.0%	0.0%	On	-							1
5/8"	16.00		93%	100.0%	0.0%	be 50%			N					50.0% %
1/2"	12.50	90%	90%	100.0%	0.0%									1
3/8"	9.50	86%	86%	100.0%	0.0%	40%								40.0%
1/4"	6.30		79%	100.0%	0.0%					\				1
#4	4.75	76%	76%	100.0%	0.0%					1				1
#8	2.36		66%	100.0%	0.0%	30%				+N $ -$				30.0%
#10	2.00	65%	65%	100.0%	0.0%		-			II V				ł
#16	1.18		56%	100.0%	0.0%									
#20	0.850	52%	52%	100.0%	0.0%	20%				T X				20.0%
#30	0.600		42%	100.0%	0.0%									1
#40	0.425	34%	34%	100.0%	0.0%	10%					*			10.0%
#50	0.300		24%	100.0%	0.0%									1
#60	0.250	20%	20%	100.0%	0.0%									1
#80	0.180		16%	100.0%	0.0%	0%	100,000	10.000	1.000	0.10	الللق	0.010	111	↓ 0.0% .001
#100	0.150	14%	14%	100.0%	0.0%		100.000	10.000	1.000	0.10	~	0.010	0.	.001
#140	0.106		12%	100.0%	0.0%			Particle	Size (mm)					
#170	0.090		12%	100.0%	0.0%									
#200	0.075	11.0%	11.0%	100.0%	0.0%	+ Sieve S	zes —	Max Specs		Min Specs	_	Sieve	Results	
		chnical Services PS, 1996-9	ļ.											
				and ourselves, all reports are	submitted as the confide	ential property of clients, and autho	ization for publicat	on of statements, co	nclusions or extra	cts from or regar	ding our rep	orts is reserved	d pending ou	r written app

Reviewed by: Meghan Blodgett-Carrillo

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-2009
Sample Date:	7/19/2021
Test Date:	10/12/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT5-GB-7.5-17.2 ft

 Visual Soil Description:
 brown sand

 Type of Specimen:
 Remolded Cylindrical Shear Box

 Specimen Diameter (in):
 2.5

Specimen Height (in): 2.3

Specimen Height (in): 1

Rate of Strain (in/min): 0.0208

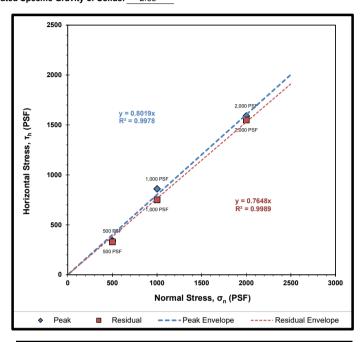
Estimated Specific Gravity of Solids: 2.65

Summary of Sample	e Data:	σ _n =500 PSF			
Initial Moisture Content (%):	25.3				
	Initial	Post-Consolidation			
Dry Density (PCF):	106.6	108.7			
Void Ratio:	0.580	0.549			
Porosity (%):	36.7	35.5			
Degree of Saturation (%):	saturated	saturated			

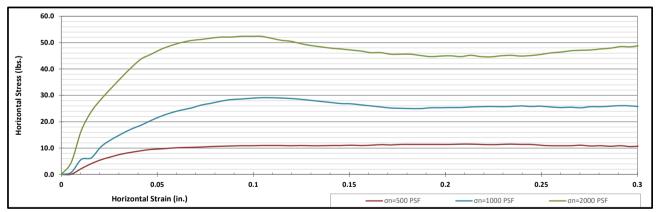
Summary of Samp	le Data:	σ _n =1000 PSF			
Initial Moisture Content (%):	25.2				
	Initial	Post-Consolidation			
Dry Density (PCF):	107.2	109.2			
Void Ratio:	0.571	0.543			
Porosity (%):	36.3	35.2			
Degree of Saturation (%):	saturated	saturated			

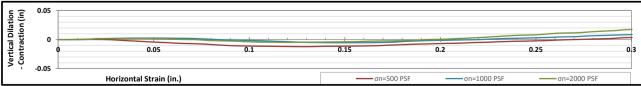
Summary of Samp	le Data:	σ _n =2000 PSF			
Initial Moisture Content (%):	25.8				
	Initial	Post-Consolidation			
Dry Density (PCF):	106.6	109.4			
Void Ratio:	0.581	0.540			
Porosity (%):	36.7	35.1			
Degree of Saturation (%):	saturated	saturated			

ESTIMATED STRENGTH PARAMETERS							
	PEAK	RESIDUAL					
Angle of Internal Friction, φ (°):	39	37					
Cohesion (PSF):	0	0					



Failure Envelope Test Values:									
Normal Stress, σ _n (PSF):	500	1000	2000						
Peak Horizontal Stress, τ _h (PSF):	340	860	1590						
Residual Horizontal Stress, τ _h (PSF):	330	750	1550						





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ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Pr	Project: Q.C Lower Duw roject #: 21B233 Client: Anchor QEA Source: LDW21-GT5-GB- umple #: B21-2010	•	Sample Date To	eived: 29-Jul-21 d By: Client ested: 14-Oct-21 d By: A. Eifrig		Visual Identific Sand with Silt Sample Color brown	cation
		× · · · · · · · · · · · · · · · · · · ·	100 1 11				
		#1	mit Determination #2 #3	3 #4	#5	#6	ļ
	Weight of Wet Soils + Pan:	#1	#2 #3	, #4	#3	#0	
	Weight of Dry Soils + Pan:	Liquid 1	imit cannot be established				
	Weight of Pan:	Enquie :	and camer of established				
	Weight of Dry Soils:						Liquid Limit @ 25 Blows: N/A
	Weight of Moisture:						Plastic Limit: N/A
	% Moisture: Number of Blows:						Plasticity Index, I _P : N/A
		Plastic Liu	mit Determination	3 #4	#5	#6	
	Weight of Wet Soils + Pan:	#1	#2 #3) #4	#3	#6	
	Weight of Dry Soils + Pan:	Plastic li	mit cannot be determined				
	Weight of Pan:						
	Weight of Dry Soils: Weight of Moisture:						Certificate #: 1366 01, 1366 02 & 1366 04
	% Moisture:						34 Miles 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
		Plas	sticity Chart				Liquid Limit
	70 %						100% F
	60 %			"U" Line			90%
	50 %			, J. , , ,	WALL LARE		80%
×	50 %			CH or OH			70%
Plasticity Index	40 %			CHO			60%
ξ	30 %						io W 50%
stic	55 %						40%
Pla	20 %	CLorOL		MH or OH			30%
	10 %			IVIN OF UN			20%
	CL-ML	ML or OL					10%
	0 % 10%	20% 30% 40%	50% 60%	70% 80%	90% 1	00% 110%	0%
		L	iquid Limit				10 100 Number of Blows, "N"
	Copyright Spears Engineering & Tech		-				rumber of blond, it

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Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the liquid limit device without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumblind. Non-plastic.

Reviewed by: Meghan Blodgett-Carrillo

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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT5-GB-17.5-27.5 ft

Sample#: B21-2012

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 6-Oct-21

Tested By: K. Mendez

SP-SM, Poorly graded Sand with Silt

Unified Soil Classification System, ASTM-2487

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D43} \\ \textbf{D}_{(5)} = 0.022 \\ \textbf{D}_{(10)} = 0.068 \\ \textbf{D}_{(15)} = 0.088 \\ \textbf{D}_{(30)} = 0.136 \\ \textbf{D}_{(50)} = 0.239 \\ \textbf{D}_{(60)} = 0.297 \\ \textbf{D}_{(90)} = 1.161 \\ \textbf{Partice} = 2/15 \end{array}$ mm % Gravel = 0.6% % Sand = 88.5% mm % Silt & Clay = 11.0% mm mm Liquid Limit = n/a Plasticity Index = n/a mm Sand Equivalent = n/a

mm Fracture %, 1 Face = n/a

Coeff, of Curvature, $C_C = 0.91$ Coeff. of Uniformity, $C_U = 4.38$

Fineness Modulus = 1.33 Plastic Limit = n/a Moisture %, as sampled = 30.6% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face =

					Dı	ıst Ratio =	2/15		Fractu	re %, 2+	Faces =	n/a		Re	q'd Fr	acture	%, 2+	Faces =	
				AS	TM C136, AST	M D6913,	ASTM C11	7											
			Interpolated						Gro	in Size Distr	ibution								
		Cumulative			ı				Ē.										
	Size	Percent	Percent	Specs	Specs		ь	90 fe fe	, i	3/8"	eoQ 9	888	8888	3458					
US	Metric	Passing	Passing	Max	Min	1	100% ᇵ					# # #	+++	-	ттт		TTTT	T 100.	.0%
12.00"	300.00		100%	100.0%	0.0%		-				1								
10.00"	250.00		100%	100.0%	0.0%						\								
8.00"	200.00		100%	100.0%	0.0%		90%				++-*							90.0	1%
6.00"	150.00		100%	100.0%	0.0%							N.							
4.00"	100.00		100%	100.0%	0.0%		80%								Ш			80.0	19%
3.00"	75.00		100%	100.0%	0.0%		-											1	
2.50"	63.00		100%	100.0%	0.0%		ł												
2.00"	50.00	100%	100%	100.0%	0.0%		70%						1					70.0	19%
1.75"	45.00		100%	100.0%	0.0%													1	
1.50"	37.50		100%	100.0%	0.0%														
1.25"	31.50		100%	100.0%	0.0%		60%	1 1					i				###	60.0	
1.00"	25.00	100%	100%	100.0%	0.0%	D C	ŀ						1						in g
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	50%											50.0	% Passing
5/8"	16.00		100%	100.0%	0.0%	84	50,0						1					30.0	₩ PK
1/2"	12.50	100%	100%	100.0%	0.0%		-						1					1	
3/8"	9.50	100%	100%	100.0%	0.0%		40%											40.0	1%
1/4"	6.30		100%	100.0%	0.0%													1	
#4	4.75	99%	99%	100.0%	0.0%								ı						
#8	2.36		99%	100.0%	0.0%		30%							\			###	30.0	1%
#10	2.00	99%	99%	100.0%	0.0%		t							1					
#16	1.18		90%	100.0%	0.0%		20%							ļ				20.0	YE
#20	0.850		87%	100.0%	0.0%		20,0							V				1 20.0	,,,,
#30	0.600		84%	100.0%	0.0%		-							Ĭ.				1	
#40	0.425	82%	82%	100.0%	0.0%		10%	+-++						- 1			-	10.0	1%
#50	0.300		61%	100.0%	0.0%										K	, IIII		- 1	
#60	0.250		52%	100.0%	0.0%										1	+	*		
#80	0.180		40%	100.0%	0.0%		0%	100.00		10.000	1.0	000	-00-00	0.100		0.010	11117	0.0%	6
#100	0.150	35%	35%	100.0%	0.0%				-										
#140	0.106		21%	100.0%	0.0%					Particle	Size (mm)								
#170	0.090		16%	100.0%	0.0%														
#200	0.075	11.0%	11.0%	100.0%	0.0%		+ Sieve Size	s		Max Specs	_	 -	Min Spec	os.	_	Sie	eve Results		
Copyrigh	Spears Engineering & Tec	hnical Services PS, 1996-9	8																
I recults apply only to	actual locations and material	c tected Ac a mutual prote	ction to cliente the public	and ourselves, all reports are	cubmitted as the confide	stirl management of all	iante and authoris	-ti C	Aliantina af a		nelucione o	avtracte	£	li			- 1		

Reviewed by: Meghan Blodgett-Carrillo



Hydrometer Report

Date Received: 29-Jul-21 Project: Q.C. - Lower Duwamish Waterway Unified Soil Classification System, ASTM-2487 Project #: 21B233 Sampled By: Client SP-SM, Poorly graded Sand with Silt Client: Anchor QEA Date Tested: 6-Oct-21 Sample Color Source: LDW21-GT5-GB-17.5-27.5 ft Tested By: K. Mendez brown Sample#: B21-2012 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Sp Gr. 2.56 Sieve Analysis Sample Weight: 100.01 grams Grain Size Distribution Hydroscopic Moist .: 1.52% Sieve Percent Soils Particle ACCREDITED Adj. Sample Wgt: 98.51 Size Passing Diameter grams 3.0" 100% 75.000 mm 100% 50.000 mm Hydrometer 2.0" Soils Particle 1.5" 100% 37.500 mm Reading Corrected Percent 1 25" 100% 31.500 mm Minutes Reading **Passing** Diameter 0.0545 mm 25.000 mm 8.2% 1.0" 100% 0.0389 mm 3/4" 100% 19.000 mm 6.1% 5 5.1% 0.0248 mm 5/8" 100% 16.000 mm 15 4.5 4.6% $0.0144\ mm$ 1/2" 100% 12.500 mm 30 4 4.1% 0.0102 mm 3/8" 100% 9.500 mm 60 3.1% 0.0072 mm 1/4" 100% 6.300 mm 240 1.5 1.5% 0.0036 mm #4 99% 4.750 mm 1440 1.0% 0.0015 mm #10 99% 2.000 mm #20 87% 0.850 mm % Gravel: 0.6% Liquid Limit: n/a #40 82% 0.425 mm % Sand: 88.5% Plastic Limit: n/a #100 35% 0.150 mm Plasticity Index: n/a 0.075 mm % Silt: #200 11.0% % Clay: 10.8% 0.074 mm 0.050 mm 6.9% 4.9% 0.020 mm 0.005 mm Clavs 2.1% 0.002 mm 1.1% Colloids 0.001 mm 0.7% **USDA Soil Textural Classification** Particle Size % Sand: % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm **USDA Soil Textural Classification** All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval. Comments:

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Reviewed by:

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ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

1	Project: Q.C Lower Duwan Project #: 21B233 Client: Anchor QEA Source: LDW21-GT35-GB-5 Sample #: B21-2015	·		sampled By: Date Tested: Tested By:	Client 14-Oct-21		Visual Identific Clay Sample Color brown	cation
File Plastic		Ljavid 1	imit Determina	tion				
Weight of Dry Soils + Pan:					#4	#5	#6	
Weight of Pan: 19.88 15.05 14.81	Weight of Wet Soils + Pan:	30.42	27.71	26.95				
Weight of Pan: 19.88 15.05 14.81		27.89	24.44	23.66				
Weight of Flory Soils: 8.01 9.39 8.85								
Number of Blows: 25 20 15								Liquid Limit @ 25 Blows: 32 %
Number of Blows: 25 20 15								
Weight of Wet Soils + Pan: 37,34 36,36 35,86 Weight of Dry Soils + Pan: 31.03 30,33 Weight of Pan: 0.52 0.50 Weight of Moisture: 0.52 0.50 Weight of Moisture: 0.90% 9.0% 9.0% 9.0% 9.0% 9.0% 9.0% 9.0% 9.0% 9.0% 9.0% 9.0% 9.0% 9.								Plasticity Index, I _P : 23 %
Weight of Wet Soils + Pan: 37.34 36.36 Weight of Dry Soils + Pan: 31.03 30.33 Weight of Pan: 31.03 30.33 Weight of Pan is 31.03 30.33 Weight of Moisture: 0.52 0.50 Weight of Moisture: 9.0 % 9.0 % Plasticity Chart Plasticity Chart On the Company of Technical Services PS, 1996-98 Company to actual beatons and materials tested. As a nutural protection to cleans, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding the conclusions of the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding the confidential property of clients, and authorization for publication of statements, conclusions are conclusions.	Number of Blows:	25	20	15				
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Weight of Dry Soils: 5.79 5.53 Weight of Moisture: 0.52 0.50 % Moisture: 9.0 % 9.0 % Plasticity Chart One of the control of								
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Plasticity Chart O % O W O W O W O W O W O W O W O W O W								Certificate #: 1366.01, 1366.02 & 1366.04
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	is reserved pending our written approval.							

Comments:			
	Neyh Balget aille		

Meghan Blodgett-Carrillo

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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT35-GB-15-16.5 ft

Sample#: B21-2017

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 6-Oct-21

Tested By: K. Mendez

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

mm

gray



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{c} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.004 \\ \textbf{D}_{(10)} = 0.009 \\ \textbf{D}_{(15)} = 0.017 \\ \textbf{D}_{(30)} = 0.057 \\ \textbf{D}_{(50)} = 0.119 \\ \textbf{D}_{(60)} = 0.148 \\ \textbf{D}_{(90)} = 0.320 \\ \textbf{Partice} = 11/31 \\ \end{array}$ mm % Gravel = 0.0% % Sand = 64.9% mm % Silt & Clay = 35.1% mm mm Liquid Limit = n/a mm Plasticity Index = n/amm

Sand Equivalent = n/a Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 2.36$ Coeff. of Uniformity, $C_U = 16.11$ Fineness Modulus = 0.52

Plastic Limit = n/a Moisture %, as sampled = 27.4% Req'd Sand Equivalent =
Req'd Fracture %. 1 Face =

recquiracture 70, 11 acc -
Req'd Fracture %, 2+ Faces =

					D	oust Ratio = 11/3	31		Fractur	e %, 2+	Faces	= n/a		Re	eq'd Fi	ractur	e %, 2	2+ Fac	es =
				AS	TM C136, AS	TM D6913, AST	TM C117												
			Interpolated						Grai	n Size Dist	ribution								
			Cumulative																
Sieve		Percent	Percent	Specs	Specs		b in	6 4 W	, 2° %	3/8"	eoQ :	288	9 2 9 8	88 88					
US	Metric	Passing	Passing	Max	Min	_	100%				** :	# # # ################################	* * * * * * * * * * * * * * * * * * *			тт			T 100.0%
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#10	2.00	100%	100%	100.0%	0.0%										\				ł
#16	1.18		100%	100.0%	0.0%														1
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#140	0.106	01/0	46%	100.0%	0.0%					Particle	Size (mm)								
#170	0.090		40%	100.0%	0.0%														
#200	0.075	35.1%	35.1%	100.0%	0.0%	1 .	Sieve Sizes		,	Nax Specs			- Min Spe	acs.			Sieve Re	ei ilte	
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				and ourselves, all reports are	cubmitted as the confide	antial property of clients	and authorization	n for nubl	cation of et	atamante ac	nalucione e	or aytmot	te from or	ragardin	o our pan	orte ie ra	carried n	anding ou	r written ann

Comments:		
Reviewed by:	Magh Classed and Somille	
	Meghan Blodgett-Carrillo	



Hydrometer Report

Date Received: 29-Jul-21 Project: Q.C. - Lower Duwamish Waterway Unified Soil Classification System, ASTM-2487 Project #: 21B233 Sampled By: Client SM, Silty Sand Client: Anchor QEA Date Tested: 6-Oct-21 Sample Color Source: LDW21-GT35-GB-15-16.5 ft Tested By: K. Mendez gray Sample#: B21-2017 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Sp Gr. 2.59 Sieve Analysis Sample Weight: 102.29 grams Grain Size Distribution Hydroscopic Moist .: 1.10% Sieve Percent Soils Particle ACCREDITED Adj. Sample Wgt: 101.18 Size Passing Diameter grams 3.0" 100% 75.000 mm 100% 50.000 mm Hydrometer 2.0" Soils Particle 1.5" 100% 37.500 mm Reading Corrected Percent 1 25" 100% 31.500 mm Minutes Reading **Passing** Diameter 0.0486 mm 25.000 mm 27.5 27.7% 1.0" 100% 23 2% 0.0352 mm 3/4" 100% 19.000 mm 23 18 18.1% 0.0230 mm 5/8" 100% 16.000 mm 15 13 13.1% $0.0137\ mm$ 1/2" 100% 12.500 mm 30 10.5 10.6% 0.0099 mm 3/8" 100% 9.500 mm 60 8.1% 0.0070 mm 1/4" 100% 6.300 mm 240 5 5.0% 0.0036 mm #4 100% 4.750 mm 1440 3.0% 0.0015 mm #10 100% 2.000 mm #20 100% 0.850 mm % Gravel: 0.0% Liquid Limit: n/a #40 99% 0.425 mm % Sand: 64.9% Plastic Limit: n/a #100 61% 0.150 mm Plasticity Index: n/a 0.075 mm % Silt: 28.8% #200 35.1% % Clay: 0.074 mm 34.8% 0.050 mm 30.4% 0.020 mm 16.5% 0.005 mm Clavs 6.3% 3.5% 0.002 mm Colloids 2.0% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm **USDA Soil Textural Classification** Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval. Comments:

Reviewed by:

| Meghan Blodgett-Carrillo

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-2017
Sample Date:	7/20/2021
Test Date:	10/6/2021
Technician:	M. Carrillo

Sample Source: LDW21-GT35-GB-15-16.5 ft
Visual Soil Description: gray sand

Type of Specimen: Remolded Cylindrical Shear Box
Specimen Diameter (in): 2.5

Specimen Height (in): 2.3

Specimen Height (in): 1

Rate of Strain (in/min): 0.0208

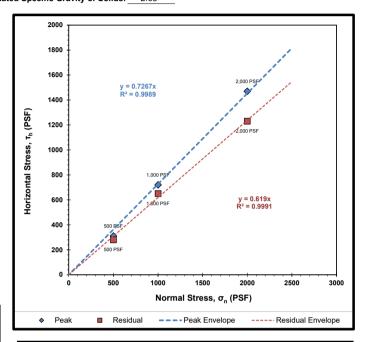
Estimated Specific Gravity of Solids: 2.65

Summary of Sampl	e Data:	σ _n =500 PSF				
Initial Moisture Content (%):	29.5					
	Initial	Post-Consolidation				
Dry Density (PCF):	109.5	110.5				
Void Ratio:	0.539	0.525				
Porosity (%):	35.0	34.4				
Degree of Saturation (%):	saturated	saturated				

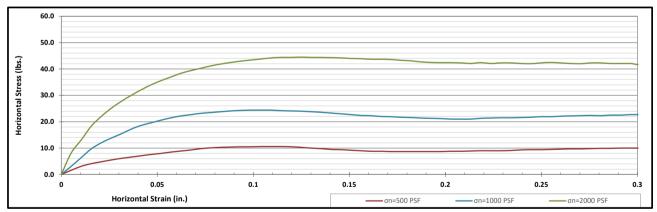
Summary of Samp	le Data:	σ _n =1000 PSF				
Initial Moisture Content (%):	30.1					
	Initial	Post-Consolidation				
Dry Density (PCF):	108.1	110.4				
Void Ratio:	0.559	0.527				
Porosity (%):	35.8	34.5				
Degree of Saturation (%):	saturated	saturated				

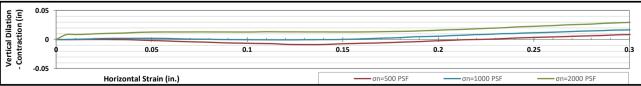
Summary of Samp	le Data:	σ _n =2000 PSF				
Initial Moisture Content (%):	32.2					
	Initial	Post-Consolidation				
Dry Density (PCF):	107.5	110.7				
Void Ratio:	0.567	0.522				
Porosity (%):	36.2	34.3				
Degree of Saturation (%):	saturated	saturated				

ESTIMATED STR	ENGTH PARA	METERS
	PEAK	RESIDUAL
Angle of Internal Friction, φ (°):	36	32
Cohesion (PSF):	0	0



Failure Envelope Test Values:								
Normal Stress, σ _n (PSF):	500	1000	2000					
Peak Horizontal Stress, τ _h (PSF):	310	720	1470					
Residual Horizontal Stress, τ _h (PSF):	280	650	1230					





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT35-GB-20-21.5 ft

Sample#: B21-2018

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 6-Oct-21 Tested By: K. Mendez

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Space

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{c} \textbf{ASTM D43} \\ D_{(5)} = 0.019 \\ D_{(10)} = 0.038 \\ D_{(15)} = 0.058 \\ D_{(30)} = 0.108 \\ D_{(50)} = 0.166 \\ D_{(60)} = 0.189 \\ D_{(50)} = 0.0304 \end{array}$ mm % Gravel = 0.0% % Sand = 80.5% mm % Silt & Clay = 19.5% mm mm Liquid Limit = n/a Plasticity Index = n/a mm Sand Equivalent = n/a

 $D_{(90)} = 0.304$ mm Fracture %, 1 Face = n/a

Unified Soil Classification System, ASTM-2487

Coeff. of Curvature, $C_C = 1.60$ Coeff. of Uniformity, $C_U = 4.92$ Fineness Modulus = 0.68

Plastic Limit = n/a Moisture %, as sampled = 27.6% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face =

			Dust Ratio = 13/66 Fracture %, 2+ Faces = n/a			Req'd Fracture %, 2+ Faces =													
				AS	TM C136, AS	TM D6913, A	STM C11	7											
		Actual	Interpolated						G	Frain Size	Distribu	tion							
			Cumulative		1														
Sieve	Size	Percent	Percent	Specs	Specs		ь		, 5½ F	oi 206		2 2 2	2 8 9 8	8888	28				
US	Metric	Passing	Passing	Max	Min		100%	******************	• (• • •	v3 × 8 m	> <u> </u>	** * *	7	# # # # # # # # # # # # # # # # # # #	H				T 100.0%
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1.00"	25.00	100%	100%	100.0%	0.0%	2	ł							1					2
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	50%												50.0%
5/8"	16.00		100%	100.0%	0.0%	96	50%												50.0% 88
1/2"	12.50	100%	100%	100.0%	0.0%														- 1
3/8"	9.50	100%	100%	100.0%	0.0%		40%				444	4	Щ.	11	ШШ.	<u> </u>			40.0%
1/4"	6.30		100%	100.0%	0.0%														- 1
#4	4.75	100%	100%	100.0%	0.0%														1
#8	2.36		100%	100.0%	0.0%		30%		HHHH		++++	+-+				++-			30.0%
#10	2.00	100%	100%	100.0%	0.0%		ł								V				1
#16	1.18		100%	100.0%	0.0%		20%								Ĭ.				20.0%
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#40	0.425	99%	99%	100.0%	0.0%		10%				+++				Ш	-	-##		10.0%
#50	0.300		90%	100.0%	0.0%		1												1
#60	0.250	86%	86%	100.0%	0.0%		- 1												1
#80	0.180		56%	100.0%	0.0%		0%	100.00		10,000		1,00	libid. D	00 100 H	100		0.010		0.0%
#100	0.150	43%	43%	100.0%	0.0%			100.00	-	10.000		1.00	-	0.			2.010		2.001
#140	0.106		29%	100.0%	0.0%					Po	rticle Size	(mm)							
#170	0.090		24%	100.0%	0.0%														
#200	0.075	19.5%	19.5%	100.0%	0.0%		Sieve Size	5		- Max Sp	ecs	_	• — h	vin Specs			Siev	e Results	
Copyright	Spears Engineering & Tec	hnical Services PS, 1996-9	8																

Reviewed by: _

Materials Testing & Consulting, Inc. Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting



ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

P	Project: Q.C Lower Duw roject #: 21B233 Client: Anchor QEA Source: LDW21-GT35-Gl ample #: B21-2020	•		te Received: Sampled By: Date Tested: Tested By:	Client 14-Oct-21		Visual Identific Silty Sand Sample Color brown	cation
		Liquid L	imit Determina	tion				
		#1	#2	#3	#4	#5	#6	
	Weight of Wet Soils + Pan:							
	Weight of Dry Soils + Pan:	Liquid	limit cannot be es	tablished				
	Weight of Pan:							Liquid Limit @ 25 Blows: N/A
	Weight of Dry Soils: Weight of Moisture:							Liquid Limit @ 25 Blows: N/A Plastic Limit: N/A
	% Moisture:							Plasticity Index, I _P : N/A
<u> </u>	Number of Blows:							
		Plastic L	imit Determina	tion				
		#1	#2	#3	#4	#5	#6	
	Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Weight of Pan:	Plastic	limit cannot be de	termined				
	Weight of Dry Soils: Weight of Moisture: % Moisture:							ACCREDITED Certificate #: 1366.01, 1366.02 & 1366.04
	70 % T	Pla	sticity Chart					Liquid Limit
	60 %				In Line	, ine		90%
l u	50 %			,,,	, OH _	WALL LAND		80%
Plasticity Index	40 %			CY.	orOH			70%
city	30 %							woisum 60%
asti	20.07	OL						40%
4	20 %	ClorOL		M	IH or OH			30%
	10 %							20%
	0 % CL-ML	ML or OL						10%
	0% 10%	20% 30% 40%		60% 70%	80%	90% 1	00% 110%	0% 10 100
			Liquid Limit					Number of Blows, "N"
	Copyright Spears Engineering & Tech	nical Services PS, 1996-98						

All results apply only to actual locations and mate reports is reserved pending our written approval.

Liquid limit cannot be established as the material displays rapid dilation upon spreading into the cup. At lower moistures the material does not spread into the liquid limit device without tearing the soil cake. Plastic limit cannot be determined as the material does not roll down to 1/8" threads before cracking or crumblind. Non-plastic.

Reviewed by: Meghan Blodgett-Carrillo

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Client:	Anchor QEA	Date:	October 25, 2021
Address:	21328 2nd Drive SE	Project:	Q.C Lower Duwamish Waterway
	Bothell, WA 98021	Project #:	21B233
Attn:	Garrett Timm	Sample #:	B21-2143-2162
Revised on:		Date sampled:	August 5, 2021

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	Please See Attached Reports		Sulfate Soundness	
	Proctor	-		Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count			LA Abrasion	
X	Moisture Content	Please See Attached Report	X	Direct Shear	Please See Attached Reports
	Specific Gravity, Coarse		X	Specific Gravity, Soils	Please See Attached Reports
	Specific Gravity, Fine				
X	Hydrometer Analysis	Please See Attached Reports			
X	Atterberg Limits	Please See Attached Reports			
	_				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted, Meghan Blodgett-Carrillo

WABO Supervising Laboratory Technician



Moisture Content - ASTM C566, ASTM D2216

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	
Date Received: July 29, 2021	Sampled by: Client
Date Tested: October 15, 2021	Tested by: A. Eifrig

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B21-2143	LDW21-GT48-GB-21.6-25 ft	234.6	512.3	437.5	74.8	202.9	36.9%
B21-2144	LDW21-GT48-GB-25-30 ft	221.6	1232.1	959.0	273.1	737.4	37.0%
B21-2145	LDW21-GT48-GB-30-35 ft	215.3	1034.5	826.3	208.2	611.0	34.1%
B21-2146	LDW21-GT48-GB-35-36.5 ft	235.3	1073.2	832.7	240.5	597.4	40.3%
B21-2147	LDW21-GT53-GB-0-1.5 ft	228.9	845.1	638.7	206.4	409.8	50.4%
B21-2148	LDW21-GT53-GB-0-5 ft	208.5	682.6	526.4	156.2	317.9	49.1%
B21-2149	LDW21-GT53-GB-5-6.5 ft	222.9	1006.1	801.8	204.3	578.9	35.3%
B21-2150	LDW21-GT53-GB-5-10 ft	229.4	762.5	595.5	167.0	366.1	45.6%
B21-2151	LDW21-GT53-GB-10-15 ft	221.1	1092.3	749.6	342.7	528.5	64.8%
B21-2152	LDW21-GT53-GB-15-20 ft	220.4	805.0	678.3	126.7	457.9	27.7%
B21-2153	LDW21-GT53-GB-20-23.5 ft	222.9	998.0	819.4	178.6	596.5	29.9%
B21-2154	LDW21-GT53-GB-23.5-25 ft	217.3	990.1	795.4	194.7	578.1	33.7%
B21-2155	LDW21-GT53-GB-25-28.6 ft	222.6	807.8	656.4	151.4	433.8	34.9%
B21-2156	LDW21-GT53-GB-28.6-30 ft	224.3	929.6	800.4	129.2	576.1	22.4%
B21-2157	LDW21-GT48-SPT-0-0.7 ft	268.9	742.1	658.8	83.3	389.9	21.4%
B21-2158	LDW21-GT48-SPT-0.7-1.5 ft	310.9	685.1	612.8	72.3	301.9	23.9%
B21-2159	LDW21-GT48-SPT-10-11.5 ft	319.8	870.6	717.8	152.8	398.0	38.4%
B21-2160	LDW21-GT48-SPT-15-16.5 ft	301.0	852.0	723.3	128.7	422.3	30.5%
B21-2161	LDW21-GT48-SPT-20-20.6 ft	302.0	675.6	567.7	107.9	265.7	40.6%
B21-2162	LDW21-GT48-SPT-20.6-21.5 ft	303.2	829.7	715.1	114.6	411.9	27.8%
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All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:

Meghan Blodgett-Carrillo



Moisture Content - ASTM D854

Client: Anchor QEA
Sampled by: Client
Tested by: A. Eifrig

Sample #	Location	Tare	Tare	Mass of Dry Soil	Pycno ID	•	Volume of Pycno	Water @ Tx		Pycno filled w/ water	Water, 0.1 *C	SpG of Soils	Factor	Corrected SpG
B21-2143	LDW21-GT48-GB-21.6-25 ft	420.68	495.04	74.4	TSA-010	180.3	499.5	0.99854	725.29	679.12		2.6377506		2.6386475
B21-2148	LDW21-GT53-GB-0-5 ft	413.74	512.57	98.8	TSA-011	190.3	499.5	0.99856	747.85	689.15		2.4627054		2.4635674
B21-2152	LDW21-GT53-GB-15-20 ft	379.63	483.20	103.6	TSA-017	187.9	499.4	0.99841	751.03	686.50	19.1	2.6531994		2.65373
B21-2155	LDW21-GT53-GB-25-28.6 ft	394.13	472.87	78.7	TSA-022	198.0	499.5	0.99856	743.69	696.72	18.3	2.478377	1.00035	2.4792444
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All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:

Meghan Blodgett-Carrillo



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT48-GB-21.6-25 ft

Sample#: B21-2143

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 15-Oct-21 Tested By: A. Eifrig

Visual Identification Silt with Sand and Clay Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $D_{(5)} = 0.001$ $D_{(10)} = 0.003$ mm % Gravel = 0.0% % Sand = 12.3% mm $D_{(15)}^{(15)} = 0.004$ % Silt & Clay = 87.7% mm $D_{(30)} = 0.010$ mm Liquid Limit = n/a $D_{(50)} = 0.023$ Plasticity Index = n/a $D_{(60)} = 0.040$ mm Sand Equivalent = n/a $D_{(90)} = 0.090$ Dust Ratio = 29/33 mm Fracture %, 1 Face = n/a Fracture %, 2+ Faces = n/a

Plastic Limit = n/a Moisture %, as sampled = 36.9% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

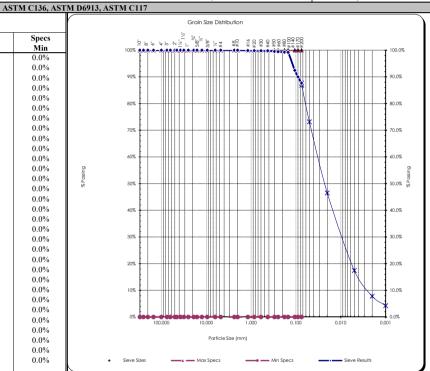
Coeff. of Curvature, $C_C = 0.94$ Coeff. of Uniformity, $C_U = 14.64$

Fineness Modulus = 0.02

				1 40,	7 1.112 (1000, 11
		Actual	Interpolated		
		Cumulative	Cumulative		
Sieve Size		Percent	Percent	Specs	Specs
US	Metric	Passing	Passing	Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%

		Actual	Interpolated		
		Cumulative	Cumulative		
Sieve Size		Percent	Percent	Specs	Specs
US	Metric	Passing	Passing	Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		100%	100.0%	0.0%
#20	0.850		100%	100.0%	0.0%
#30	0.600		100%	100.0%	0.0%
#40	0.425	100%	100%	100.0%	0.0%
#50	0.300		100%	100.0%	0.0%
#60	0.250		99%	100.0%	0.0%
#80	0.180		99%	100.0%	0.0%
#100	0.150	99%	99%	100.0%	0.0%
#140	0.106		92%	100.0%	0.0%
#170	0.090		90%	100.0%	0.0%
#200	0.075	87.7%	87.7%	100.0%	0.0%

Meghan Blodgett-Carrillo



Comments: Reviewed by:



Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Visual Identification **Project #:** 21B233 Silt with Sand and Clay Sampled By: Client Client: Anchor QEA Date Tested: 15-Oct-21 Sample Color Source: LDW21-GT48-GB-21.6-25 ft Tested By: A. Eifrig brown Sample#: B21-2143 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Sp. Gr Sieve Analysis 2.64 Sample Weight: 50.35 **Grain Size Distribution** Hydroscopic Moist .: 2.46% Soils Particle Sieve Percent ACCREDITED Adj. Sample Wgt: 49.14 Size Passing Diameter 3.0" 100% 75.000 mm 2.0" 100% 50.000 mm Hydrometer Soils Particle 1.5" Reading Corrected Percent 100% 37.500 mm Minutes 1.25" 100% 31.500 mm Reading Passing Diameter 25.000 mm 63.7% 0.0464 mm 31 1.0" 100% 2 27.5 56.5% $0.0338\ mm$ 3/4" 100% 19.000 mm 24 49.3% 0.0218 mm 5/8" 100% 16.000 mm 17.5 36.0% 0.0131 mm 1/2" 100% 12.500 mm 30 14 28.8% 0.0095 mm 3/8" 100% 9.500 mm 0.0068 mm 60 11.5 23.6% 1/4" 100% 6.300 mm 240 12.3% 0.0035 mm 100% 4.750 mm #4 6.2% 0.0015 mm #10 100% 2.000 mm 1440 #20 100% 0.850 mm 0.0% Liquid Limit: n/a % Gravel: #40 100% 0.425 mm % Sand: 12.3% Plastic Limit: n/a #100 99% 0.150 mm % Silt: 70.2% Plasticity Index: n/a #200 87.7% 0.075 mm 0.074 mm % Clay: 17.5% Silts 86.8% 0.050 mm 73.1% 0.020 mm 46.5% 17.5% 0.005 mm Clays 7.8% $0.002 \ mm$ Colloids 4.2% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: 2.0 - 0.05 mm 0.05 - 0.002 mm % Silt: < 0.002 mm % Clay: **USDA Soil Textural Classification** All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval. **Comments:**

Reviewed by:



ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Visual Identification Sampled By: Client Silt with Sand and Clay **Project #:** 21B233 Client: Anchor QEA Date Tested: 15-Oct-21 Sample Color Source: LDW21-GT48-GB-21.6-25 ft Tested By: A. Eifrig Sample #: B21-2143 **Liquid Limit Determination** Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Unable to establish liquid limit Weight of Pan: Liquid Limit @ 25 Blows: Weight of Dry Soils: Plastic Limit: Plasticity Index, I_P: Weight of Moisture: % Moisture: N/A N/A Number of Blows: Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Cannot determined plastic limit Weight of Pan: Weight of Dry Soils: Weight of Moisture: % Moisture: **Plasticity Chart Liquid Limit** 100% 60 % 90% 50 % Plasticity Index 40 % 60% 30 % 50% 20 % 10 % 20% 110% 100% 10% Liquid Limit 10 100

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Comments: Liquid limit cannot be established as the material displays rapid dilation. At lower moistures, the material does not spread into the liquid limit device without tearing the soil cake. Plastic limit cannot be determined as the sample does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Visual Identification Sampled By: Client Silt with Sand and Clay **Project #:** 21B233 Client: Anchor QEA Date Tested: 15-Oct-21 Sample Color Source: LDW21-GT48-GB-25-30 ft Tested By: A. Eifrig Sample #: B21-2144 **Liquid Limit Determination** Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Unable to establish liquid limit Weight of Pan: Liquid Limit @ 25 Blows: Weight of Dry Soils: Plastic Limit: Plasticity Index, I_P: Weight of Moisture: % Moisture: N/A N/A Number of Blows: Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Cannot determined plastic limit Weight of Pan: Weight of Dry Soils: Weight of Moisture: % Moisture: **Plasticity Chart Liquid Limit** 100% 60 % 90% 50 % Plasticity Index 40 % 60% 30 % 50% 20 % 10 % 20% 110% 100% 10% Liquid Limit 10 100

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Comments: Liquid limit cannot be established as the material displays rapid dilation. At lower moistures, the material does not spread into the liquid limit device without tearing the soil cake. Plastic limit cannot be determined as the sample does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:

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ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Visual Identification Silt with Clay Client: Anchor QEA, LLC Date Tested: 18-Oct-21 Sample Color Source: LDW21-GT48-GB-30-35 ft Tested By: C. Kirk-Patterson brown Sample #: B21-2145 **Liquid Limit Determination** Weight of Wet Soils + Pan: 29.11 30.59 34.12 Weight of Dry Soils + Pan: 25.96 26.90 30.59 Weight of Pan: 15.19 14.77 19.81 Liquid Limit @ 25 Blows: Weight of Dry Soils: 10.78 30 % 10.77 12.13 Weight of Moisture: 3.15 3.69 3.53 Plastic Limit: 24 % % Moisture: 29.3 % 32.8 % Plasticity Index, I_P: 30.4 % Number of Blows: **Plastic Limit Determination** Weight of Wet Soils + Pan: 34.58 35.80 Weight of Dry Soils + Pan: 33.37 34.35 Weight of Pan: 28.28 28.60 Weight of Dry Soils: 5.75 5.09 Weight of Moisture: 1.21 1.45 % Moisture: 23.8 % 25.2 % **Plasticity Chart** Liquid Limit 35% 60 % 30% CH or OH 50 % 25% Plasticity Index Moisture 30 % CLOOL 20 % MH or OH 10% 10 % 5% CL-ML ML or OL 30% 20% 100% 100 **Liquid Limit**

All results apply only to actual locations and mat reports is reserved pending our written approval.

Comments:

Reviewed by:

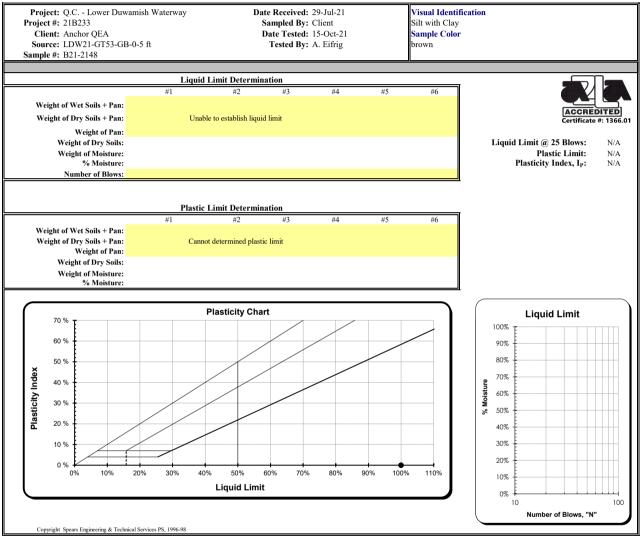
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ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils



All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our

Comments: Liquid limit cannot be established as the material displays rapid dilation. At lower moistures, the material does not spread into the liquid limit device without tearing the soil cake. Plastic limit cannot be determined as the sample does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT53-GB-5-10 ft

Sample#: B21-2150

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 15-Oct-21 Tested By: A. Eifrig

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

brown

ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{c} \textbf{AS IM D43I} \\ D_{(5)} = 0.005 \\ D_{(10)} = 0.028 \\ D_{(15)} = 0.056 \\ D_{(30)} = 0.081 \\ D_{(50)} = 0.113 \\ D_{(60)} = 0.129 \\ D_{(90)} = 0.335 \\ P_{(90)} = 10/37 \end{array}$ mm % Gravel = 0.0% % Sand = 73.4% mm % Silt & Clay = 26.6% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a

mm Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 1.81$ Coeff. of Uniformity, $C_U = 4.67$

Fineness Modulus = 0.43 Plastic Limit = n/a Moisture %, as sampled = 45.6% Req'd Sand Equivalent =

Req'd Fracture %, 1 Face =

				16		ust Ratio = 10/3			Fı	acture	%, 2-	⊦ Fac	es = 1	n/a		R	eq'd I	Fractu	re %,	2+ Fa	aces =
		Actual	Interpolated	AS	1M C136, AS	ГМ D6913, AST	M CII														
		Cumulative				ľ				Grain	Size Dis	tributio	n								
Sieve	Size	Percent	Percent	Specs	Specs			io io i+		- % :- -		_				20,00					
US	Metric	Passing	Passing	Max	Min		100% ●●	0.0 4	8 6 ≥	= ₁ 8, 	3/8"	##	= 2	# 3	888	34.58					- 100.0%
12.00"	300.00		100%	100.0%	0.0%	1	100%	Ĭ Ĭ			m	`\\``		***							100.0%
10.00"	250.00		100%	100.0%	0.0%		-								\						1
8.00"	200.00		100%	100.0%	0.0%		90%	-							\		HHH		₩₩		90.0%
6.00"	150.00		100%	100.0%	0.0%																1
4.00"	100.00		100%	100.0%	0.0%		1								Į.						1
3.00"	75.00		100%	100.0%	0.0%		80%				*****				1	-111	HH		m		80.0%
2.50"	63.00		100%	100.0%	0.0%		t								1						1
2.00"	50.00	100%	100%	100.0%	0.0%		70%		ШШ		ЩШ	Ш		Ш		Ш	Ш		ШШ		70.0%
1.75"	45.00		100%	100.0%	0.0%		F		Ш				- 11	IIIT		M	T				1,
1.50"	37.50		100%	100.0%	0.0%		-														1
1.25"	31.50		100%	100.0%	0.0%		60%	-				+				₩	HHH		₩₩		60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	p	-									1111					1 :
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	- 1									1					1 1
5/8"	16.00		100%	100.0%	0.0%	₩.	50%		H		###			mm		111	ttt		m		50.0%
1/2"	12.50	100%	100%	100.0%	0.0%		1									ì					1
3/8"	9.50	100%	100%	100.0%	0.0%		40%		ШШ		ЩЩ	Ш		Ш			Ш		Ш		40.0%
1/4"	6.30		100%	100.0%	0.0%																1
#4	4.75	100%	100%	100.0%	0.0%		ŀ									Ň					1
#8	2.36		100%	100.0%	0.0%		30%	-	HHH	-		+	$-\parallel$	++++	++	-H	+++	-	+++		30.0%
#10	2.00	100%	100%	100.0%	0.0%		-														1
#16	1.18		99%	100.0%	0.0%		1									- 111					1
#20	0.850		99%	100.0%	0.0%		20%				11111										20.0%
#30	0.600		99%	100.0%	0.0%												*				1
#40	0.425	98%	98%	100.0%	0.0%		10%		Ш		ЩЩ						$\parallel \lambda \parallel$		Ш		10.0%
#50	0.300		87%	100.0%	0.0%													*	4		1
#60	0.250		82%	100.0%	0.0%		ł												*	*	
#80	0.180		76%	100.0%	0.0%		0%	100.0	200	40 400	0.000	اولنا	1.000	-	-00-00	0.100	ш	0.0	11111	ПТ	0.0%
#100	0.150	73%	73%	100.0%	0.0%			100.0	100	10	.000		1.000	,		0.100		0.0	110		0.001
#140	0.106		46%	100.0%	0.0%						Partic	le Size (r	nm)								
#170	0.090		36%	100.0%	0.0%																
#200	0.075	26.6%	26.6%	100.0%	0.0%		Sieve Sizes		_	мо	x Specs		_	•—	Min Spe	cs	_		Sieve I	Results	
Copyright		chnical Services PS, 1996-98																			

Reviewed by: _



Hydrometer Report

-	-	Duwamish Wa	iterway Date Recei			assification Sys	stem, ASTM-2487
Project #: 1	21B233		Sampled	l By: Client	SM, Silty Sand		
Client :	Anchor QEA		Date Tes	sted: 15-Oct-21	Sample Color		
Source:	LDW21-GT5	3-GB-5-10 ft	Tested	By: A. Eifrig	brown		
Sample#:	B21-2150						
A	STM D7928	, HYDROM	ETER ANALYSI	S		ASTM	D6913
Assumed Sp. Gr	2.65						Analysis
Sample Weight:	100.03	grams				Grain Size	Distribution
Hydroscopic Moist.:	2.23%	C			Sieve	Percent	Soils Particle
Adj. Sample Wgt :	97.85	grams		ACCREDITED	Size	Passing	Diameter
and a market wight	,,,,,	8		Certificate #: 1366.01	3.0"	100%	75.000 mm
Hydrometer					2.0"	100%	50.000 mm
Reading	Corrected	Percent	Soils Particle		1.5"	100%	37.500 mm
Minutes	Reading	Passing	Diameter		1.25"	100%	31.500 mm
1	12	12.3%	0.0516 mm		1.0"	100%	25.000 mm
2	11.5	11.8%	0.0368 mm		3/4"	100%	19.000 mm
5	9	9.2%	0.0235 mm		5/8"	100%	16.000 mm
15	8	8.2%	0.0137 mm		1/2"	100%	12.500 mm
30	7	7.2%	0.0097 mm		3/8"	100%	9.500 mm
60	6.5	6.6%	0.0069 mm		1/4"	100%	6.300 mm
240	3	3.1%	0.0035 mm		#4	100%	4.750 mm
1440	2	2.0%	0.0014 mm		#10	100%	2.000 mm
					#20	99%	0.850 mm
% Gravel:	0.0%	I	Liquid Limit: n/a		#40	98%	0.425 mm
% Sand:	73.4%	1	Plastic Limit: n/a		#100	73%	0.150 mm
% Silt:	22.0%	Pla	sticity Index: n/a		#200	26.6%	0.075 mm
% Clay:	4.6%				Silts	26.0%	0.074 mm
						14.3%	0.050 mm
						8.8%	0.020 mm
					Clays	4.6%	0.005 mm
						2.3%	0.002 mm
					Colloids	1.4%	0.001 mm
	USDA S	oil Textural (Classification		1		
		Particle Size					
% Sand:		2.0 - 0.05 mm					
% Silt:		0.05 - 0.002 mr	n				
% Clay:		< 0.002 mm					
	LICD A C	.9.7.	C1				
	USDA S	Loamy Sand	Classification				
		Loamy Sand					
All results apply only to actual locatio	ns and materials tested.	. As a mutual protection t	to clients, the public and ourselves.	all reports are submitted as the co	nfidential property of clients.	and authorization for public	cation of statements, conclusions or extracts from or
regarding our reports is reserved pend					117	1	
Comments:							
Comments:							
							_
		abget and b	<i>'</i>				
	Worth the	reget andlo					
Raviowed by:	1	0					

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-2150
Sample Date:	8/5/2021
Test Date:	10/18/2021
Technician:	M. Carrillo

 Sample Source:
 LDW21-GT53-GB-5-10 ft

 Visual Soil Description:
 brown silty sand with gravel

 Type of Specimen:
 Remolded Cylindrical Shear Box

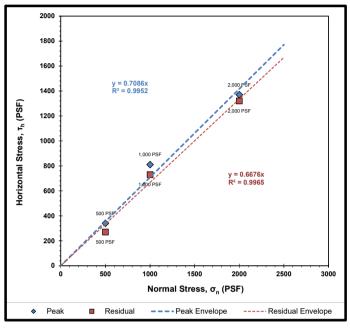
 Specimen Diameter (in):
 2.5

Summary of Sample	e Data:	σ _n =500 PSF
Initial Moisture Content (%):	30.0	
	Initial	Post-Consolidation
Dry Density (PCF):	109.7	110.6
Void Ratio:	0.536	0.523
Porosity (%):	34.9	34.3
Degree of Saturation (%):	saturated	saturated

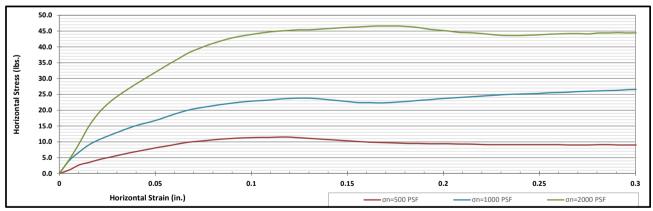
Summary of Samp	le Data:	σ _n =1000 PSF
Initial Moisture Content (%):	29.9	
	Initial	Post-Consolidation
Dry Density (PCF):	110.2	112.7
Void Ratio:	0.529	0.495
Porosity (%):	34.6	33.1
Degree of Saturation (%):	saturated	saturated

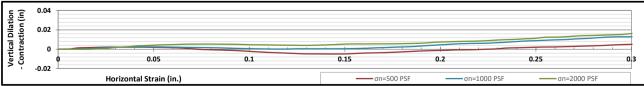
Summary of Sample	Data:	σ _n =2000 PSF
Initial Moisture Content (%):	29.3	
	Initial	Post-Consolidation
Dry Density (PCF):	110.5	114.2
Void Ratio:	0.524	0.475
Porosity (%):	34.4	32.2
Degree of Saturation (%):	saturated	saturated

ESTIMATED STR	ENGTH PARA	METERS
	PEAK	RESIDUAL
Angle of Internal Friction, φ (°):	35	34
Cohesion (PSF):	0	0



Failure Envelope Test	Values:		
Normal Stress, σ _n (PSF):	500	1000	2000
Peak Horizontal Stress, τ _h (PSF):	340	810	1370
Residual Horizontal Stress, τ _h (PSF):	270	730	1320





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT53-GB-10-15 ft Sample#: B21-2151

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 15-Oct-21 Tested By: A. Eifrig

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

mm

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications

No Specs

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{l} \textbf{ASIM D43} \\ \textbf{D}_{(5)} = 0.022 \\ \textbf{D}_{(10)} = 0.044 \\ \textbf{D}_{(15)} = 0.066 \\ \textbf{D}_{(30)} = 0.118 \\ \textbf{D}_{(50)} = 0.199 \\ \textbf{D}_{(60)} = 0.246 \\ \textbf{D}_{(90)} = 0.735 \\ \textbf{Partice} = 13(61) \end{array}$ mm % Gravel = 3.1% % Sand = 79.8% mm % Silt & Clay = 17.1% mm mm Liquid Limit = n/a Plasticity Index = n/amm

Sand Equivalent = n/a Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 1.30$ Coeff. of Uniformity, $C_U = 5.62$ Fineness Modulus = 1.23 Plastic Limit = n/a

Moisture %, as sampled = 64.8% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

					D	ust Ratio = 13/61		Fractu	e %, 2+ F	aces = 1	ı/a		Req'd	Fracture	%, 2+	Faces =
	_			AS	TM C136, AS	FM D6913, ASTM C11	17									
			Interpolated					Gro	in Size Distrib	ution						
		Cumulative			1			==								
Sieve		Percent	Percent	Specs	Specs	ь	90 40 44 10		, § 4. 1	∞2 2°8	8 8 8	88848	28			
US	Metric	Passing	Passing	Max	Min	100%		• (• • • • •		** **	+++	* * * * *	-			T 100.0%
12.00"	300.00		100%	100.0%	0.0%				****							1 1
10.00"	250.00		100%	100.0%	0.0%											1 1
8.00"	200.00		100%	100.0%	0.0%	90%					VIII				####	90.0%
6.00"	150.00		100%	100.0%	0.0%						Ŋ.					1
4.00"	100.00		100%	100.0%	0.0%	80%					l N					80.0%
3.00"	75.00		100%	100.0%	0.0%	00%					1					00.00
2.50"	63.00		100%	100.0%	0.0%						N					1
2.00"	50.00	100%	100%	100.0%	0.0%	70%		+++-+			4444					70.0%
1.75"	45.00		100%	100.0%	0.0%						1111					1 1
1.50"	37.50		100%	100.0%	0.0%							M I				1 1
1.25"	31.50		100%	100.0%	0.0%	60%					++++	i				60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	D C						V				
3/4"	19.00	100%	100%	100.0%	0.0%	P 20%						1				50.0% _k g
5/8"	16.00		100%	100.0%	0.0%	P6 20%										30.0% be
1/2"	12.50	100%	100%	100.0%	0.0%							i				1
3/8"	9.50	98%	98%	100.0%	0.0%	40%					4444	1				40.0%
1/4"	6.30		97%	100.0%	0.0%							1				1
#4	4.75	97%	97%	100.0%	0.0%							11				1 1
#8	2.36		96%	100.0%	0.0%	30%		++++			++++	+			_	30.0%
#10	2.00	96%	96%	100.0%	0.0%							1				1 1
#16	1.18		94%	100.0%	0.0%	20%										20.0%
#20	0.850	94%	94%	100.0%	0.0%	20%							•			20.0%
#30	0.600		86%	100.0%	0.0%											1
#40	0.425	80%	80%	100.0%	0.0%	10%					++++				###	10.0%
#50	0.300		66%	100.0%	0.0%											
#60	0.250	61%	61%	100.0%	0.0%											
#80	0.180		46%	100.0%	0.0%	0%	100.000	-	10.000	1.000	1010-0	0.10	10 10	0.010)	0.0%
#100	0.150	40%	40%	100.0%	0.0%		100.000					0.10	-	0.010		5.001
#140	0.106		26%	100.0%	0.0%				Particle Si	ze (mm)						
#170	0.090		22%	100.0%	0.0%											
#200	0.075	17.1%	17.1%	100.0%	0.0%	+ Sieve Siz	es		Max Specs	_	— мі	n Specs		s	ieve Result	S
		hnical Services PS, 1996-98														
				and ourselves, all reports are	submitted as the confide	ential property of clients, and authoric	zation for pu	blication of st	atements, conc	lusions or ex	tracts fro	m or regar	ding our r	eports is res	erved pend	ing our written appr

Comments: Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT53-GB-15-20 ft Sample#: B21-2152

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 15-Oct-21

Tested By: A. Eifrig

Unified Soil Classification System, ASTM-2487

SP-SM, Poorly graded Sand with Silt

Sample Color:

brown



30.0%

ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASTM D43} \\ \textbf{D}_{(5)} = 0.055 \\ \textbf{D}_{(10)} = 0.087 \\ \textbf{D}_{(15)} = 0.106 \\ \textbf{D}_{(30)} = 0.158 \\ \textbf{D}_{(50)} = 0.203 \\ \textbf{D}_{(60)} = 0.226 \\ \textbf{D}_{(90)} = 0.376 \end{array}$ mm % Gravel = 0.1%% Sand = 93.2% mm % Silt & Clay = 6.8% mm mm Liquid Limit = n/a mm Plasticity Index = n/amm mm

Sand Equivalent = n/a Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 1.27$ Coeff. of Uniformity, $C_U = 2.59$ Fineness Modulus = 0.98

Plastic Limit = n/a Moisture %, as sampled = 27.7% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = eq'd Fracture %, 2+ Faces =

					_	$D_{(90)} = 0.$		mm		cture %,					Keq'a	
						oust Ratio =			Fracti	ure %, 2+	- Face	s = n/a		Re	q'd F	ractu
		A . 1	T	AS	STM C136, AS	TM D6913, A	STM C	117								
		Actual	Interpolated Cumulative			ľ			Gr	rain Size Dis	tribution	1				
6:	Size	Percent	Percent	C	C	4			ž ,							
US	Metric	Passing	Passing	Specs Max	Specs Min			5 % 6 t	, %\frac{1}{2} = ,	3/8'' 3/8'' 1/4''	∞ <u>2</u> ##	2 8 2 8 3 8 4 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	2 2 3 8	8458		
12.00"	300.00	1 assing	100%	100.0%	0.0%	-	100%	****			T**		***	***	Ш	T
10.00"	250.00		100%	100.0%	0.0%								111			
8.00"	200.00		100%	100.0%	0.0%		90%				₩.		4		Ш.	-
6.00"	150.00		100%	100.0%	0.0%								1			
4.00"	100.00		100%	100.0%	0.0%								1			
3.00"	75.00		100%	100.0%	0.0%		80%				+++		+	-	-	+
2.50"	63.00		100%	100.0%	0.0%			l I					1			
2.00"	50.00	100%	100%	100.0%	0.0%		70%	<u>L</u>					₩.		Ш	
1.75"	45.00		100%	100.0%	0.0%		70,0	ł II								
1.50"	37.50		100%	100.0%	0.0%											
1.25"	31.50		100%	100.0%	0.0%		60%	[- 			+++		₩	-		+
1.00"	25.00	100%	100%	100.0%	0.0%	p p										
3/4"	19.00	100%	100%	100.0%	0.0%	% Possing										
5/8"	16.00		100%	100.0%	0.0%	86	50%									
1/2"	12.50	100%	100%	100.0%	0.0%											
3/8"	9.50	100%	100%	100.0%	0.0%		40%				444		Щ	,	Ш.	
1/4"	6.30		100%	100.0%	0.0%			t I II					111			
#4	4.75	100%	100%	100.0%	0.0%											
#8	2.36		100%	100.0%	0.0%		30%	1			+++		++++	\		+
#10	2.00	100%	100%	100.0%	0.0%			t I II						1		
#16	1.18		100%	100.0%	0.0%		20%	ł I			Ш				Ш	
#20	0.850	99%	99%	100.0%	0.0%		20%				H		ITT		П	I
#30	0.600		98%	100.0%	0.0%			F						1		
#40	0.425	97%	97%	100.0%	0.0%		10%	+++	++++-+		+++		+++			-
#50	0.300		78%	100.0%	0.0%									*		
#60	0.250	71%	71%	100.0%	0.0%											
#80	0.180		40%	100.0%	0.0%		0%	100.0		10.000		1.000	J-00-0	0.100		0.0
#100	0.150	26%	26%	100.0%	0.0%				-							
#140	0.106		15%	100.0%	0.0%					Particl	e Size (mr	m)				
#170	0.090		11%	100.0%	0.0%											

0.0%

Comments: Reviewed by: Meghan Blodgett-Carrillo

6.8%

100.0%

6.8%

#200

0.075



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT53-GB-20-23.5 ft

Sample#: B21-2153

Reviewed by: _

Meghan Blodgett-Carrillo

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 15-Oct-21

Tested By: A. Eifrig

Unified Soil Classification System, ASTM-2487

SP-SM, Poorly graded Sand with Silt

Sample Color:

mm

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications	
No Specs	

Sample Meets Specs? N/A

 $\begin{array}{c} \textbf{ASIM D431} \\ \textbf{D}_{(5)} = 0.060 \\ \textbf{D}_{(10)} = 0.091 \\ \textbf{D}_{(15)} = 0.112 \\ \textbf{D}_{(30)} = 0.166 \\ \textbf{D}_{(50)} = 0.217 \\ \textbf{D}_{(60)} = 0.243 \\ \textbf{D}_{(90)} = 0.522 \\ \textbf{Patio} = 7/99 \end{array}$ mm % Gravel = 0.6% % Sand = 93.2% mm % Silt & Clay = 6.2% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a

Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 1.24$ Coeff. of Uniformity, $C_U = 2.67$ Fineness Modulus = 1.20 Plastic Limit = n/a

Moisture %, as sampled = 29.9% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

					Du	ust Ratio =	7/99		acture %,							6, 2+ F	
				AS	TM C136, AST	TM D6913,	ASTM C117										
		Actual	Interpolated						Grain Size	Distribution	n						
		Cumulative	Cumulative														
Sieve		Percent	Percent	Specs	Specs		b i.	5 4 6 4 6 6 E	5/8/7	. 4 ± ± ±	288	\$ 88 8	8258				
US	Metric	Passing	Passing	Max	Min	1	100%		• • • • • • • • • • • • • • • • • • •	***	A	++++		пт			T 100.0%
12.00"	300.00		100%	100.0%	0.0%		1				•						- 1
10.00"	250.00		100%	100.0%	0.0%		1				11/2						1
8.00"	200.00		100%	100.0%	0.0%		90%			-							90.0%
6.00"	150.00		100%	100.0%	0.0%		ŀ					1					1
4.00"	100.00		100%	100.0%	0.0%		80%										80.0%
3.00"	75.00		100%	100.0%	0.0%		*** F										00.0%
2.50"	63.00		100%	100.0%	0.0%		F										1
2.00"	50.00	100%	100%	100.0%	0.0%		70%			++++		$\bot \downarrow \bot$					70.0%
1.75"	45.00		100%	100.0%	0.0%							1					1
1.50"	37.50		100%	100.0%	0.0%		ŀ					Ì					1
1.25"	31.50		100%	100.0%	0.0%		60%			++++							60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	2	ŀ										2
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	50%										50.0%
5/8"	16.00		100%	100.0%	0.0%	PG	50%										50.0% be
1/2"	12.50	100%	100%	100.0%	0.0%		1										-1
3/8"	9.50	100%	100%	100.0%	0.0%		40%										40.0%
1/4"	6.30		100%	100.0%	0.0%		į.										1
#4	4.75	99%	99%	100.0%	0.0%		ŀ										1
#8	2.36		99%	100.0%	0.0%		30%			++++							30.0%
#10	2.00	99%	99%	100.0%	0.0%		ŀ						<u> </u>				1
#16	1.18		97%	100.0%	0.0%								i III				
#20	0.850	96%	96%	100.0%	0.0%		20%						1				20.0%
#30	0.600		92%	100.0%	0.0%		1						, I				1
#40	0.425	88%	88%	100.0%	0.0%		10%						_ \				10.0%
#50	0.300		70%	100.0%	0.0%		ţ						, l				1
#60	0.250	63%	63%	100.0%	0.0%		ŀ										1
#80	0.180		36%	100.0%	0.0%		0%	100.000	10.000	-	1.000	0-00-0	0.100		0.010		0.0%
#100	0.150	24%	24%	100.0%	0.0%			.00.000	10.000		1.000		5.100		0.010		0.001
#140	0.106		14%	100.0%	0.0%				Po	rticle Size (m	ım)						
#170	0.090		10%	100.0%	0.0%												
#200	0.075	6.2%	6.2%	100.0%	0.0%		+ Sieve Sizes	_	— Max Sp	ecs .		— Min Sp	ecs		Siev	e Results	
		hnical Services PS, 1996-9	1														
				and ourselves, all reports are	submitted as the confide	ntial property of cl	ients, and authorizat	ion for publicati	on of statemen	s, conclusio	ns or extrac	ts from or	r regarding	our report	s is reserve	ed pending	our written app

Comments:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT53-GB-23.5-25 ft

Sample#: B21-2154

#100

#140

#170

#200

Comments:

0.150

0.106

0.090

0.075

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 15-Oct-21 Tested By: A. Eifrig

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Spece

Sample Meets Specs? N/A

 $\begin{array}{c} D_{(5)} = 0.008 \\ D_{(10)} = 0.015 \\ D_{(15)} = 0.023 \\ D_{(30)} = 0.046 \\ D_{(50)} = 0.077 \\ \end{array}$ mm % Gravel = 0.0% % Sand = 51.1% mm % Silt & Clay = 48.9% mm mm Liquid Limit = n/a mm Plasticity Index = n/a $D_{(60)} = 0.098$ $D_{(60)} = 0.186$ mm Sand Equivalent = n/a Fracture %, 1 Face = n/a

aces = n/a

Coeff. of Curvature, $C_C = 1.41$ Coeff. of Uniformity, $C_U = 6.38$ Fineness Modulus = 0.17

Plastic Limit = n/a Moisture %, as sampled = 33.7% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

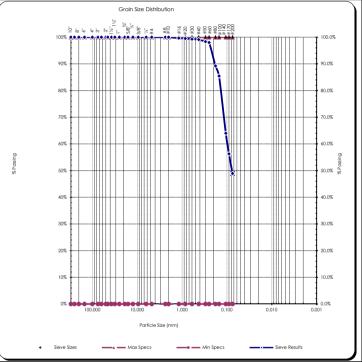
						$D_{(90)} = 0.186$	mm		Fractur		
					Di	ust Ratio = 39/79		Fr	acture (%, 2+	- Fac
				AS	TM C136, AST	ΓM D6913, ASTM (C117				
		Actual	Interpolated						Grain S	Size Dist	tributi
		_	Cumulative		T						
	Size	Percent	Percent	Specs	Specs		ما ما ط	. 4. % 5. % 	- %	§e ∶• 4•	000
US	Metric	Passing	Passing	Max	Min	100	0%			er -> ≡	
12.00"	300.00		100%	100.0%	0.0%						
10.00"	250.00		100%	100.0%	0.0%		11				
8.00"	200.00		100%	100.0%	0.0%	91	0%	-###		###	+
6.00"	150.00		100%	100.0%	0.0%						
4.00"	100.00		100%	100.0%	0.0%	or or	0%				Ш
3.00"	75.00		100%	100.0%	0.0%		/* F				
2.50"	63.00		100%	100.0%	0.0%		- []				
2.00"	50.00	100%	100%	100.0%	0.0%	70	0%			₩₩	₩.
1.75"	45.00		100%	100.0%	0.0%						
1.50"	37.50		100%	100.0%	0.0%						
1.25"	31.50		100%	100.0%	0.0%	60	0%	-###	+	###	++-
1.00"	25.00	100%	100%	100.0%	0.0%	Di	1				
3/4"	19.00	100%	100%	100.0%	0.0%	P P OSS	0%				Ш
5/8"	16.00		100%	100.0%	0.0%	P6 2	/* F				
1/2"	12.50	100%	100%	100.0%	0.0%		- []				
3/8"	9.50	100%	100%	100.0%	0.0%	46	0%			₩₩	₩-
1/4"	6.30		100%	100.0%	0.0%						
#4	4.75	100%	100%	100.0%	0.0%						
#8	2.36		100%	100.0%	0.0%	31	0%		-	###	++-
#10	2.00	100%	100%	100.0%	0.0%		1				
#16	1.18		100%	100.0%	0.0%	2	0%				Ш
#20	0.850	100%	100%	100.0%	0.0%	21	/* F				
#30	0.600		99%	100.0%	0.0%		FI				
#40	0.425	99%	99%	100.0%	0.0%	10	0%			₩₩	₩-
#50	0.300		98%	100.0%	0.0%						
#60	0.250	98%	98%	100.0%	0.0%						
#80	0.180		89%	100.0%	0.0%	1	0% 000-0	100.000	10.	.000	هنن
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Reviewed by: Meghan Blodgett-Carrillo

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64%

56%

48.9%



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT53-GB-25-28.6 ft

Sample#: B21-2155

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 15-Oct-21 Tested By: A. Eifrig

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

2.36

2.00

1.18

0.850

0.600

0.425

0.300

0.250

0.180

0.150

0.106

0.090

0.075

100%

42.3%

Meghan Blodgett-Carrillo

#8 #10

#16

#20

#30

#40

#50

#60

#80

#100

#140

#170

#200

Sample Meets Specs? N/A

 $D_{(5)} = 0.003$ $D_{(10)} = 0.008$ mm % Gravel = 0.0%% Sand = 57.7% mm $D_{(15)} = 0.013$ % Silt & Clay = 42.3% mm $D_{(30)}^{(13)} = 0.049$ mm Liquid Limit = n/a $D_{(50)} = 0.093$ mm Plasticity Index = n/a $D_{(60)} = 0.116$ mm Sand Equivalent = n/a $D_{(90)} = 0.316$ mm

Fracture %, 1 Face = n/a Fracture %, 2+ Faces = n/a

Coeff. of Curvature, $C_C = 2.78$ Coeff. of Uniformity, $C_U = 15.33$ Fineness Modulus = 0.37

Plastic Limit = n/a Moisture %, as sampled = 34.9% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

						D(90)	0.510
						ust Ratio =	
				AS	TM C136, AS	FM D6913.	, ASTM
		Actual	Interpolated				
		Cumulative	Cumulative				
Sieve	Size	Percent	Percent	Specs	Specs		
US	Metric	Passing	Passing	Max	Min		1
12.00"	300.00		100%	100.0%	0.0%	1	
10.00"	250.00		100%	100.0%	0.0%		
8.00"	200.00		100%	100.0%	0.0%		
6.00"	150.00		100%	100.0%	0.0%		
4.00"	100.00		100%	100.0%	0.0%		
3.00"	75.00		100%	100.0%	0.0%		
2.50"	63.00		100%	100.0%	0.0%		
2.00"	50.00	100%	100%	100.0%	0.0%		
1.75"	45.00		100%	100.0%	0.0%		
1.50"	37.50		100%	100.0%	0.0%		
1.25"	31.50		100%	100.0%	0.0%		
1.00"	25.00	100%	100%	100.0%	0.0%	2	
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	
5/8"	16.00		100%	100.0%	0.0%	PK.	
1/2"	12.50	100%	100%	100.0%	0.0%		
3/8"	9.50	100%	100%	100.0%	0.0%		
1/4"	6.30		100%	100.0%	0.0%		
#4	4.75	100%	100%	100.0%	0.0%		

100%

100%

100%

100%

100%

100%

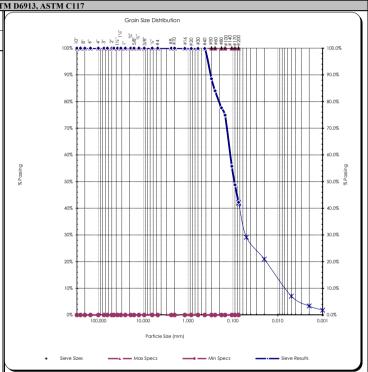
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Comments: Reviewed by:

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Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Unified Soil Classification System, ASTM-2487 **Project #:** 21B233 Sampled By: Client SM, Silty Sand Client: Anchor QEA Date Tested: 15-Oct-21 Sample Color Source: LDW21-GT53-GB-25-28.6 ft Tested By: A. Eifrig brown Sample#: B21-2155 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Sp. Gr Sieve Analysis 2.48 Sample Weight: 75.36 **Grain Size Distribution** Hydroscopic Moist .: 0.35% Soils Particle Sieve Percent ACCREDITED Adj. Sample Wgt: 75.10 Size Passing Diameter 3.0" 100% 75.000 mm 2.0" 100% 50.000 mm Hydrometer Soils Particle 1.5" Reading Corrected Percent 100% 37.500 mm Minutes 1.25" 100% 31.500 mm Reading Passing Diameter 25.000 mm 0.0519 mm 22 30.8% 1.0" 100% 2 19 26.6% $0.0374\ mm$ 3/4" 100% 19.000 mm 17 23.8% 0.0239 mm 5/8" 100% 16.000 mm 16.8% 0.0142 mm 1/2" 100% 12.500 mm 30 12.6% 0.0102 mm 3/8" 100% 9.500 mm 0.0073 mm 60 9.8% 1/4" 100% 6.300 mm 240 5.6% 0.0037 mm 100% 4.750 mm #4 2.8% 0.0015 mm #10 100% 2.000 mm 1440 100% 0.850 mm #20 Liquid Limit: n/a % Gravel: 0.0% #40 100% 0.425 mm % Sand: 57.7% Plastic Limit: n/a #100 75% 0.150 mm % Silt: 35.2% Plasticity Index: n/a #200 42.3% 0.075 mm 0.074 mm % Clay: 7.1% Silts 41.8% 29.2% 0.050 mm 0.020 mm 20.9% 0.005 mm Clays 7.1% 3.4% $0.002 \ mm$ Colloids 1.8% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: 2.0 - 0.05 mm 0.05 - 0.002 mm % Silt: < 0.002 mm % Clay: **USDA Soil Textural Classification** Sandy Loam All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval. **Comments:** Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT53-GB-28.6-30 ft

Sample#: B21-2156

Reviewed by:

Meghan Blodgett-Carrillo

Date Received: 29-Jul-21 Sampled By: Client

Date Tested: 15-Oct-21 Tested By: A. Eifrig

Unified Soil Classification System, ASTM-2487

SP-SM, Poorly graded Sand with Silt

Sample Color: grayish-brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Space

Sample Meets Specs? N/A

 $\begin{array}{l} \textbf{ASIM D43} \\ \textbf{D}_{(5)} = 0.055 \\ \textbf{D}_{(10)} = 0.088 \\ \textbf{D}_{(15)} = 0.109 \\ \textbf{D}_{(30)} = 0.160 \\ \textbf{D}_{(50)} = 0.197 \\ \textbf{D}_{(60)} = 0.216 \\ \textbf{D}_{(90)} = 0.348 \\ \end{array}$ mm % Gravel = 0.0% % Sand = 93.2% mm % Silt & Clay = 6.8% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a

mm Fracture %. 1 Face = n/a Coeff. of Curvature, $C_C = 1.34$ Coeff. of Uniformity, $C_U = 2.44$ Fineness Modulus = 0.92

Plastic Limit = n/a Moisture %, as sampled = 22.4% Req'd Sand Equivalent = Rea'd Fracture %, 1 Face =

					D	$D_{(90)} = 0.348$ ust Ratio = 2/29	mm		Fractur	ure %, 1 2 %, 2+								Faces	
				AS		TM D6913, ASTM	C117		- ractar			u				- Jordie		- 4003	
			Interpolated		,				Grain	Size Distri	hution								
		Cumulative	Cumulative								DONOIT								
Sieve		Percent	Percent	Specs	Specs		b 1.		172 174	80 : . ∗	80 19 19 19	888	888	3888					
US	Metric	Passing	Passing	Max	Min	10	0% 🕵	*-		æ≥≐ Minnerer		HANNEY.	+++	-	птт	тт	птт	T 10	00.0%
12.00"	300.00		100%	100.0%	0.0%							1						1 1	
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8.00"	200.00		100%	100.0%	0.0%	5	0%						1				mm	90	0.0%
6.00"	150.00		100%	100.0%	0.0%								ļ						
4.00"	100.00		100%	100.0%	0.0%	,	10%						1					ar ar	0.0%
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2.50"	63.00		100%	100.0%	0.0%													1 1	
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1.75"	45.00		100%	100.0%	0.0%													1 1	
1.50"	37.50		100%	100.0%	0.0%													1 1	
1.25"	31.50		100%	100.0%	0.0%		0%										mm	1 1	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%	2	1											1 1	ing
3/4"	19.00	100%	100%	100.0%	0.0%	% Possing	0%												% %0.0
5/8"	16.00		100%	100.0%	0.0%	P6 .	0,0											1 1 ~	0.070 86
1/2"	12.50	100%	100%	100.0%	0.0%		- []											1 1	
3/8"	9.50	100%	100%	100.0%	0.0%	4	10%						-			+-+	++++	40	0.0%
1/4"	6.30		100%	100.0%	0.0%													1 1	
#4	4.75	100%	100%	100.0%	0.0%													1 1	
#8	2.36		100%	100.0%	0.0%	3	10%	-##								+-	+++	30	0.0%
#10	2.00	100%	100%	100.0%	0.0%		H											1 1	
#16	1.18		100%	100.0%	0.0%	,	10%						'	\				11.	0.0%
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#40	0.425	99%	99%	100.0%	0.0%	1	0%				-	-		_				10	0.0%
#50	0.300		84%	100.0%	0.0%									*				1 1	
#60	0.250	78%	78%	100.0%	0.0%														
#80	0.180		41%	100.0%	0.0%		0%	100,000	1000000	0.000	1.0	ŏiòid NO	-00-00	0.100		0.010		0.001	.0%
#100	0.150	25%	25%	100.0%	0.0%			. 50.000			1.0					0.010		0.001	
#140	0.106		14%	100.0%	0.0%					Particle	Size (mm)								
#170	0.090		10%	100.0%	0.0%														
#200	0.075	6.8%	6.8%	100.0%	0.0%	+ Sie	ve Sizes		^_ N	ax Specs	_		Min Spe	cs	_	s	ieve Resu	ts	
	Spears Engineering & Tec		1																

Comments:



Client:	Anchor QEA	Date:	October 25, 2021
Address:	21328 2nd Drive SE	Project:	Q.C Lower Duwamish Waterway
	Bothell, WA 98021	Project #:	21B233
Attn:	Garrett Timm	Sample #:	B21-2164-2174
Revised on:		Date sampled:	8-3-21 & 8-5-21

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	Please See Attached Reports		Sulfate Soundness	
	Proctor	-		Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count			LA Abrasion	
X	Moisture Content	Please See Attached Report	X	Direct Shear	Please See Attached Reports
	Specific Gravity, Coarse		X	Specific Gravity, Soils	Please See Attached Reports
	Specific Gravity, Fine				
X	Hydrometer Analysis	Please See Attached Reports			
X	Atterberg Limits	Please See Attached Reports			
	_				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted, Meghan Blodgett-Carrillo

WABO Supervising Laboratory Technician



Moisture Content - ASTM C566, ASTM D2216

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	-
Date Received: July 29, 2021	Sampled by: Client
Date Tested: October 18, 2021	Tested by: A. Eifrig

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B21-2164	LDW21-GT48-SPT-25-26.5 ft	233.1	1048.4	832.6	215.8	599.5	36.0%
B21-2165	LDW21-GT48-SPT-30-31.5 ft	182.3	1308.3	1004.2	304.1	821.9	37.0%
B21-2166	LDW21-GT53-SPT-10-11.5 ft	260.3	653.6	537.2	116.4	276.9	42.0%
B21-2167	LDW21-GT53-SPT-15-16.5 ft	270.1	1295.8	1089.8	206.0	819.7	25.1%
B21-2168	LDW21-GT53-SPT-20-21.5 ft	266.3	1049.6	853.9	195.7	587.6	33.3%
B21-2169	LDW21-GT53-SPT-25-26.5 ft	360.2	1271.6	1074.8	196.8	714.6	27.5%
B21-2170	LDW21-GT41-GH-0-1.3 ft	359.4	527.4	488.8	38.6	129.4	29.8%
B21-2171	LDW21-GT41-GH-1.3-2 ft	354.2	2105.6	1668.8	436.8	1314.6	33.2%
B21-2172	LWD21-GT42-GH-0-0.3 ft	341.5	409.5	366.7	42.8	25.2	169.8%
B21-2173	LWD21-GT42-GH-0.3-1.5 ft	356.9	581.1	525.1	56.0	168.2	33.3%
B21-2174	LWD21-GT42-GH-1.5-2.3 ft	224.0	439.0	407.7	31.3	183.7	17.0%
					1		
					1		
					1		
					1		
					1		
					1		
					1		
					1		

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is

Reviewed by:



Specific Gravity - ASTM D854

Project: Q.C Lower Duwamish Waterway	Client: Anchor QEA
Project #: 21B233	<u></u>
Date Received: July 29, 2021	Sampled by: Client
Date Tested: October 18, 2021	Tested by: A. Eifrig

1	I	I	1	I]			ſ	Mass of	l	i 1	1		1 1
									Pycno filled	Mass of	Temp. of		Temp.	1
				Mass of Dry		Mass of	Volume of	Density of	w/ water &					Corrected
Sample #	Location	Tare	Tare	Soil	Pycno ID	Pycno	Pycno	Water @ Tx	soils	w/ water	*C	Soils	Factor	SpG
B21-2170	LDW21-GT41-GH-0-1.3 ft	416.85	491.39	74.5	TSA-020	195.0	499.5	0.99850	738.69	693.77	18.5	2.516483	1.00030	2.5172379
B21-2174	LDW21-GT42-GH-1.5-2.3 ft	415.34	491.53	76.2	TSA-015	187.6	499.5	0.99835	733.52	686.28	19.4	2.632154	1.00014	2.6325225
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All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:

Meghan Blodgett-Carrillo



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

#100

#140

#170

#200

0.150

0.106

0.090

0.075

15.7%

Meghan Blodgett-Carrillo

Source: LDW21-GT41-GH-0-1.3 ft Sample#: B21-2170

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 18-Oct-21 Tested By: A. Eifrig

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

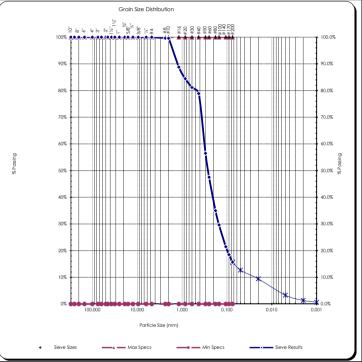
 $\begin{array}{l} \textbf{AS IM D43} \\ \textbf{D}_{(5)} = 0.008 \\ \textbf{D}_{(10)} = 0.022 \\ \textbf{D}_{(15)} = 0.068 \\ \textbf{D}_{(30)} = 0.152 \\ \textbf{D}_{(50)} = 0.264 \\ \textbf{D}_{(60)} = 0.320 \\ \textbf{D}_{(90)} = 1.271 \end{array}$ mm % Gravel = 0.0% % Sand = 84.3% mm % Silt & Clay = 15.7% mm mm Liquid Limit = n/a mm Plasticity Index = n/amm Sand Equivalent = n/a

mm Fracture %, 1 Face = n/a

Coeff. of Curvature, $C_C = 3.31$ Coeff. of Uniformity, $C_U = 14.63$ Fineness Modulus = 1.44

Plastic Limit = n/a Moisture %, as sampled = 29.8% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

					ъ.	D ₍₉₀₎ - 1.2/1	ШШ		rracture		
				A 6		ust Ratio = 1/5 FM D6913, ASTM	I C117	FT	acture %	3, 2+ 1	races
		Actual Cumulative	Interpolated Cumulative	Ac	51W C130, A5	W D0913, ASTN			Grain Siz		bution
Sieve	Size	Percent	Percent	Specs	Specs				3/8, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7,		O
US	Metric	Passing	Passing	Max	Min		2 io io	= 6×6• ≥ 6 6 4=	- 8 8	-34 <u>4</u> -344	∞ <u>0</u> ##
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10.00"	250.00		100%	100.0%	0.0%		ł I				
8.00"	200.00		100%	100.0%	0.0%		90%		++-+	₩₩	++
6.00"	150.00		100%	100.0%	0.0%						
4.00"	100.00		100%	100.0%	0.0%						
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2.00"	50.00	100%	100%	100.0%	0.0%		70%			Ш.	44
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1.50"	37.50		100%	100.0%	0.0%						
1.25"	31.50		100%	100.0%	0.0%		60%		+	###	++-
1.00"	25.00	100%	100%	100.0%	0.0%	2	<u> </u>				
3/4"	19.00	100%	100%	100.0%	0.0%	% Passing	50%				
5/8"	16.00		100%	100.0%	0.0%	₽€	50%				
1/2"	12.50	100%	100%	100.0%	0.0%						
3/8"	9.50	100%	100%	100.0%	0.0%		40%			####	
1/4"	6.30		100%	100.0%	0.0%						
#4	4.75	100%	100%	100.0%	0.0%						
#8	2.36		100%	100.0%	0.0%		30%		++	HHH	++
#10	2.00	100%	100%	100.0%	0.0%						
#16	1.18		89%	100.0%	0.0%		20%				
#20	0.850		84%	100.0%	0.0%		20,0				
#30	0.600		81%	100.0%	0.0%						
#40	0.425	79%	79%	100.0%	0.0%		10%		+	₩₩	
#50	0.300		56%	100.0%	0.0%						
#60	0.250		48%	100.0%	0.0%						
#80	0.180		35%	100.0%	0.0%		0%	00.000	10.00	100 - 1	-00-
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Comments: Reviewed by:

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Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Unified Soil Classification System, ASTM-2487 Project #: 21B233 Sampled By: Client SM, Silty Sand Client: Anchor QEA Date Tested: 18-Oct-21 Sample Color Source: LDW21-GT41-GH-0-1.3 ft Tested By: A. Eifrig brown Sample#: B21-2170 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Sp Gr: 2.52 Sieve Analysis Sample Weight: 100.37 **Grain Size Distribution** Hydroscopic Moist .: 0.83% Soils Particle Sieve Percent ACCREDITED Adj. Sample Wgt: 99.54 Size Passing Diameter 3.0" 100% 75.000 mm 2.0" 100% 50.000 mm Hydrometer Soils Particle Reading Percent 1.5" 100% 37.500 mm Corrected Minutes 1.25" 100% 31.500 mm Reading Diameter Passing 13.4% 0.0539 mm 1.0" 100% 25.000 mm 13 11.5 11.9% 0.0385 mm 3/4" 100% 19.000 mm 10.5 10.8% 0.0245 mm 5/8" 100% 16.000 mm 0.0144 mm 15 7.7% 1/2" 100% 12.500 mm 30 6.7% 0.0102 mm 3/8" 100% 9.500 mm 6.5 0.0073 mm 60 4.6% 1/4" 100% 6.300 mm 240 2.6% 0.0037 mm 100% 4.750 mm 2.5 #4 2.000 mm 0.0015 mm #10 100% 1440 1.0% 84% 0.850 mm #20 0.0% Liquid Limit: n/a % Gravel: #40 79% 0.425 mm % Sand: 84.3% Plastic Limit: n/a #100 30% 0.150 mm % Silt: 12.4% Plasticity Index: n/a #200 15.7% 0.075 mm 0.074 mm % Clay: 3.3% Silts 15.6% 12.7% 0.050 mm 0.020 mm 9.4% 3.3% 0.005 mm Clays 1.4% 0.002 mm Colloids 0.7% 0.001 mm **USDA Soil Textural Classification** Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm **USDA Soil Textural Classification** All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or **Comments:**

Reviewed by:

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

Project Number:	21B233
Laboratory Sample ID:	B21-2170
Sample Date:	8/3/2021
Test Date:	10/18/2021
Technician:	M. Carrillo

Sample Source: LDW21-GT41-GH-0-1.3 ft

Visual Soil Description: brown sand with silt and gravel

Type of Specimen: Remolded Cylindrical Shear Box

Specimen Diameter (in): 2.5

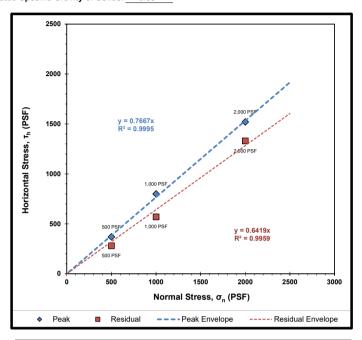
Specimen Height (in): 1
Rate of Strain (in/min): 0.0208
Estimated Specific Gravity of Solids: 2.65

Summary of Sampl	e Data:	σ _n =500 PSF				
Initial Moisture Content (%):	28.1					
	Initial	Post-Consolidation				
Dry Density (PCF):	109.2	111.5				
Void Ratio:	0.543	0.510				
Porosity (%):	35.2	33.8				
Degree of Saturation (%):	saturated	saturated				

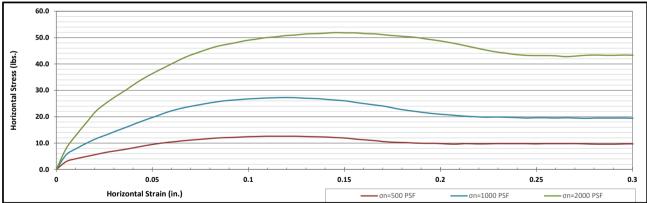
Summary of Sample	Data:	σ _n =1000 PSF
Initial Moisture Content (%):	27.3	
	Initial	Post-Consolidation
Dry Density (PCF):	110.2	115.1
Void Ratio:	0.529	0.464
Porosity (%):	34.6	31.7
Degree of Saturation (%):	saturated	saturated

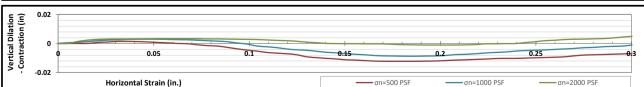
Summary of Samp	le Data:	σ _n =2000 PSF
Initial Moisture Content (%):	28.4	
	Initial	Post-Consolidation
Dry Density (PCF):	109.1	119.9
Void Ratio:	0.545	0.405
Porosity (%):	35.3	28.8
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS							
	PEAK	RESIDUAL					
Angle of Internal Friction, φ (°):	37	33					
Cohesion (PSF):	0	0					



Failure Envelope Test Values:							
Normal Stress, σ _n (PSF):	500	1000	2000				
Peak Horizontal Stress, τ _h (PSF):	370	800	1520				
Residual Horizontal Stress, τ _h (PSF):	280	570	1330				





Corporate • 777 Chrysler Drive • Burlington, WA 98233 • Phone 360.755.1990 • Fax 360.755.1980 SW Region • 2118 Black Lake Blvd. S.W.• Olympia, WA 98512 • Phone 360.534.9777 • Fax 360.534.9779 NW Region • 805 Dupont, Suite #5 • Bellingham, WA 98225 • Phone 360.647.6061 • Fax 360.647.8111 Kitsap Region • 5451 N.W. Newberry Hill Road, Suite 101 • Silverdale, WA 98383 • Phone/Fax 360.698.6787



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT41-GH-1.3-2.0 ft

Sample#: B21-2171

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 18-Oct-21 Tested By: A. Eifrig

Unified Soil Classification System, ASTM-2487

SM, Silty Sand Sample Color: brown

mm



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{c} \textbf{ASIM D43} \\ D_{(5)} = 0.022 \\ D_{(10)} = 0.044 \\ D_{(15)} = 0.066 \\ D_{(30)} = 0.170 \\ D_{(50)} = 0.277 \\ D_{(60)} = 0.330 \\ D_{(50)} = 0.330 \\ D_{(50)} = 0.324 \end{array}$ mm % Gravel = 1.1% % Sand = 81.8% mm % Silt & Clay = 17.1% mm mm Liquid Limit = n/a Plasticity Index = n/amm $D_{(90)} = 0.824$

Sand Equivalent = n/a Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 2.00$ Coeff. of Uniformity, $C_U = 7.51$ Fineness Modulus = 1.48 Plastic Limit = n/a

Moisture %, as sampled = 33.2% Req'd Sand Equivalent = Req'd Fracture %, 1 Face =

							7/32		Fractur	e %, 2+	Faces =	n/a		Req'c	l Fracti	ıre %, 2	2+ Fac	es =
				AS	TM C136, AS	M D6913, A	STM C11	7										
		Actual	Interpolated						Grai	n Size Distri	bution							
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Sieve		Percent	Percent	Specs	Specs		ъ	9. p. o. o.	2 2 2	3/84	∞2 2	8888	88888	28				
US	Metric	Passing	Passing	Max	Min		100%	**-**			-	# # # # # # # # # # # # # # # # # # #		H	т-т	пптт		T 100.0%
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#10	2.00	97%	97%	100.0%	0.0%		ŀ						1					1
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#50	0.300		54%	100.0%	0.0%													1
#60	0.250	45%	45%	100.0%	0.0%													1
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#140	0.106		21%	100.0%	0.0%					Particle:	Size (mm)							
#170	0.090		19%	100.0%	0.0%													
#200	0.075	17.1%	17.1%	100.0%	0.0%	∥ .	 Sieve Size 		^_ N	Max Specs	_	 N	vin Specs			Sieve Re	sults	
	Spears Engineering & Tec		II .	100.070	0.070	K i												

Reviewed by:



ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Visual Identification Sampled By: Client Silt with Organics **Project #:** 21B233 Date Tested: 18-Oct-21 Client: Anchor QEA Sample Color Source: LDW21-GT42-GH-0-0.3 ft Tested By: A. Eifrig Sample #: B21-2172 **Liquid Limit Determination** Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Unable to establish liquid limit Weight of Pan: Liquid Limit @ 25 Blows: Weight of Dry Soils: Plastic Limit: Plasticity Index, I_P: Weight of Moisture: % Moisture: N/A N/A Number of Blows: Weight of Wet Soils + Pan: Weight of Dry Soils + Pan: Cannot determined plastic limit Weight of Pan: Weight of Dry Soils: Weight of Moisture: % Moisture: **Liquid Limit Plasticity Chart** 0.7 100% 90% 0.6 0.5 Plasticity Index 60% 0.3 50% 0.2 0.1 20% 10% **Liquid Limit** 10 100

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our

Comments: Liquid limit cannot be established as the material displays rapid dilation. At lower moistures the material does not spread into the cup without tearing the soil cake. Plastic limit cannot be determined as the sample does not roll down to 1/8" threads before cracking or crumbling. Non-plastic.

Reviewed by:



Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

#140

#170

#200

0.106

0.090

0.075

63.8%

Source: LDW21-GT42-GH-0.3-1.5 ft Sample#: B21-2173

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 18-Oct-21 Tested By: A. Eifrig

Visual Identification Sandy Silt with Clay Sample Color: brown



Coeff. of Curvature, $C_C = 0.79$ Coeff. of Uniformity, $C_U = 37.10$

Fineness Modulus = 0.92

ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications No Specs

Sample Meets Specs? N/A

 $\begin{array}{c} D_{(5)} = 0.000 \\ D_{(10)} = 0.001 \\ D_{(15)} = 0.002 \\ D_{(30)} = 0.005 \\ D_{(50)} = 0.017 \\ \end{array}$ mm % Gravel = 4.1% % Sand = 32.0% mm % Silt & Clay = 63.8% mm mm Liquid Limit = n/a mm Plasticity Index = n/a $D_{(60)} = 0.037$ mm Sand Equivalent = n/a $D_{(90)} = 1.643$ mm Fracture %, 1 Face = n/a

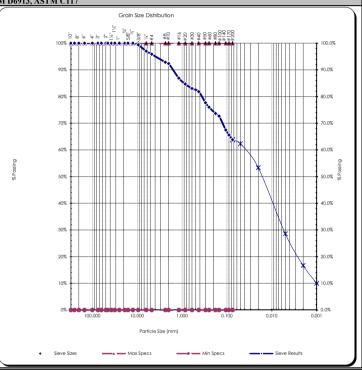
Plastic Limit = n/a Moisture %, as sampled = 33.3% Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

						$D_{(90)} = 1.043$	111111		icture /		
						st Ratio = 39/50		Fract	ure %,	2+	Fa
				AS	TM C136, AST	M D6913, ASTM C	117				
		Actual	Interpolated			ľ		G [,]	rain Size I	Distri	ibu
		7	Cumulative	_				Ę.			
Sieve		Percent	Percent	Specs	Specs		5 18 19 14 19	2 2 3	. % . % .	4.4	
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1.75"	45.00		100%	100.0%	0.0%		[]]]]]]			Ш	
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1.00"	25.00	100%	100%	100.0%	0.0%	D Li				Ш	
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#4	4.75	96%	96%	100.0%	0.0%					Ш	
#8	2.36		93%	100.0%	0.0%	30	Æ H			ĦŤ	†
#10	2.00	92%	92%	100.0%	0.0%					Ш	
#16	1.18		87%	100.0%	0.0%	20	. <u> </u>			Ш	⊥
#20	0.850		85%	100.0%	0.0%	20,	° F			Ш	
#30	0.600		83%	100.0%	0.0%		F			Ш	
#40	0.425	82%	82%	100.0%	0.0%	105	я 📙 👭			₩	+
#50	0.300		78%	100.0%	0.0%					Ш	
#60	0.250		76%	100.0%	0.0%					Ш	
#80	0.180		74%	100.0%	0.0%	0	% 000 0 0 00	4000	10,000	10	-
#100	0.150	73%	73%	100.0%	0.0%						

100.0%

100.0%

100.0%



Faces = n/a

0.0%

0.0%

0.0%

Comments: Reviewed by: Meghan Blodgett-Carrillo

67%

66%

63.8%



Hydrometer Report

Project: Q.C. - Lower Duwamish Waterway Date Received: 29-Jul-21 Visual Identification Project #: 21B233 Sampled By: Client Sandy Silt with Clay Client: Anchor QEA Date Tested: 18-Oct-21 Sample Color Source: LDW21-GT42-GH-0.3-1.5 ft Tested By: A. Eifrig brown Sample#: B21-2173 ASTM D7928, HYDROMETER ANALYSIS ASTM D6913 Assumed Sp Gr: 2.65 Sieve Analysis Sample Weight: 75.38 **Grain Size Distribution** 1.68% Hydroscopic Moist .: Soils Particle Sieve Percent ACCREDITED Adj. Sample Wgt: 74.13 Size Passing Diameter 3.0" 100% 75.000 mm 2.0" 100% 50.000 mm Hydrometer Soils Particle Reading Percent 1.5" 100% 37.500 mm Corrected Minutes Reading 1.25" 100% 31.500 mm Passing Diameter 0.0393 mm 49 61.1% 1.0" 100% 25.000 mm 45 56.1% 0.0288 mm 3/4" 100% 19.000 mm 42.5 53.0% 0.0187 mm 5/8" 100% 16.000 mm 15 34.5 43.0% 0.0115 mm 1/2" 100% 12.500 mm 30 30.5 38.0% 0.0084 mm 3/8" 99% 9.500 mm 97% 60 26 32.4% 0.0061 mm 1/4" 6.300 mm 240 22.4% 0.0032 mm 96% 4.750 mm 18 #4 2.000 mm 1440 13.7% #10 92% 0.0014 mm 11 0.850 mm 85% #20 Liquid Limit: n/a % Gravel: 4 1% #40 82% 0.425 mm % Sand: 32.0% Plastic Limit: n/a #100 73% 0.150 mm % Silt: 35.2% Plasticity Index: n/a #200 63.8% 0.075 mm 0.074 mm % Clay: 28.6% Silts 63.8% 62.3% 0.050 mm 0.020 mm 53.4% 0.005 mm Clays 28.6% 16.7% 0.002 mm Colloids 10.0% 0.001 mm **USDA Soil Textural Classification**

Particle Size % Sand: 2.0 - 0.05 mm % Silt: 0.05 - 0.002 mm % Clay: < 0.002 mm

USDA Soil Textural Classification

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or

Comments:		
	Magh Chilget and lo	
Reviewed by:	Meghan Blodgett-Carrillo	

Direct Shear Test Results:

ASTM D-3080



Project: Q.C. - Lower Duwamish Waterway

 Sample Source:
 LDW21-GT42-GH-0.3-1.5 ft

 Visual Soil Description:
 brown clay with silt

 Type of Specimen:
 Remolded Cylindrical Shear Box

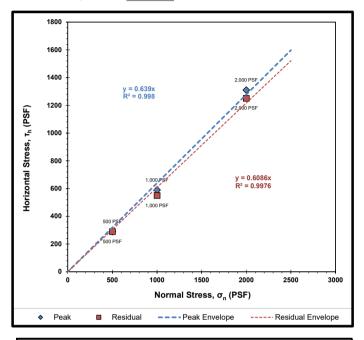
 Specimen Diameter (in):
 2.5

Summary of Samp	e Data:	σ _n =500 PSF
Initial Moisture Content (%):	34.0	
	Initial	Post-Consolidation
Dry Density (PCF):	102.5	106.8
Void Ratio:	0.644	0.578
Porosity (%):	39.2	36.6
Degree of Saturation (%):	saturated	saturated

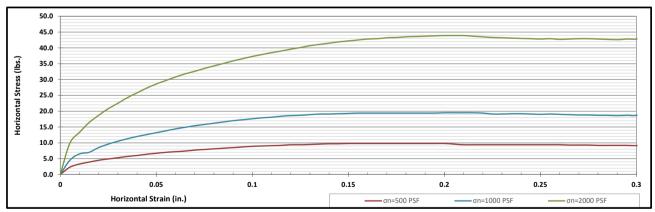
Summary of Samp	le Data:	σ _n =1000 PSF
Initial Moisture Content (%):	31.5	
	Initial	Post-Consolidation
Dry Density (PCF):	104.6	114.9
Void Ratio:	0.611	0.467
Porosity (%):	37.9	31.8
Degree of Saturation (%):	saturated	saturated

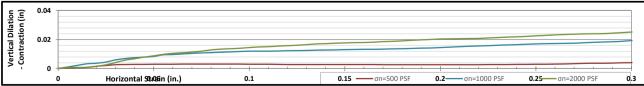
Summary of Sample	e Data:	σ _n =2000 PSF
Initial Moisture Content (%):	28.9	
	Initial	Post-Consolidation
Dry Density (PCF):	107.0	120.1
Void Ratio:	0.574	0.403
Porosity (%):	36.5	28.7
Degree of Saturation (%):	saturated	saturated

ESTIMATED STRENGTH PARAMETERS									
	PEAK	RESIDUAL							
Angle of Internal Friction, φ (°):	33	31							
Cohesion (PSF):	0	0							



Failure Envelope Test Values:								
Normal Stress, σ _n (PSF):	500	1000	2000					
Peak Horizontal Stress, τ _h (PSF):	290	590	1310					
Residual Horizontal Stress, τ _h (PSF):	290	550	1250					





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Project: Q.C. - Lower Duwamish Waterway

Project #: 21B233 Client: Anchor QEA

Source: LDW21-GT42-GH-1.5-2.3 ft

Sample#: B21-2174

Date Received: 29-Jul-21 Sampled By: Client Date Tested: 18-Oct-21 Tested By: A. Eifrig

Unified Soil Classification System, ASTM-2487

SP, Poorly graded Sand

Sample Color:

brown



ASTM D2216, ASTM D2419, ASTM D4318, ASTM D5281

Specifications
No Casasa

No Specs

Sample Meets Specs? N/A

Meghan Blodgett-Carrillo

 $\begin{array}{c} \textbf{ASIM D43} \\ D_{(5)} = 0.079 \\ D_{(10)} = 0.130 \\ D_{(15)} = 0.167 \\ D_{(30)} = 0.251 \\ D_{(50)} = 0.334 \\ D_{(60)} = 0.376 \\ D_{(50)} = 0.376 \\ D_{(50)} = 0.332 \end{array}$ mm % Gravel = 0.0% % Sand = 95.4% mm % Silt & Clay = 4.6% mm mm Liquid Limit = n/a Plasticity Index = n/amm Sand Equivalent = n/a $D_{(90)} = 0.733$

mm Fracture %, 1 Face = n/a Coeff. of Curvature, $C_C = 1.29$ Coeff. of Uniformity, $C_U = 2.90$ Fineness Modulus = 1.67

Plastic Limit = n/a Moisture %, as sampled = 17.0% Req'd Sand Equivalent =
Req'd Fracture %, 1 Face =

10	equitacture 70, 1 1 acc -
Req	'd Fracture %, 2+ Faces =

					D	ust Ratio =	3/47		Fractur	e %, 2+	Faces =	n/a		Req'd I	Fractur	e %, 2	!+ Face	s =
				AS	TM C136, AS	ΓM D6913,	ASTM C11	7										
			Interpolated						Grai	n Size Distri	bution							
		Cumulative	Cumulative															
Sieve		Percent	Percent	Specs	Specs		ь	9.4.6.09	.z. 1.%. 5/8.%.	3/8".	∞2 2°s	8 8 8 8	88888	28				
US	Metric	Passing	Passing	Max	Min	_					** * *	: = = = 		·			г	100.0%
12.00"	300.00		100%	100.0%	0.0%		1										1	
10.00"	250.00		100%	100.0%	0.0%		1										1	
8.00"	200.00		100%	100.0%	0.0%		90%	1	HHHH		++	₩				###		90.0%
6.00"	150.00		100%	100.0%	0.0%		ŀ					1					:	
4.00"	100.00		100%	100.0%	0.0%		80%					i i						80.0%
3.00"	75.00		100%	100.0%	0.0%		*** T					I						00.0%
2.50"	63.00		100%	100.0%	0.0%		F					1						
2.00"	50.00	100%	100%	100.0%	0.0%		70%				4-44	Ш				₩.		70.0%
1.75"	45.00		100%	100.0%	0.0%		1					1111					1	
1.50"	37.50		100%	100.0%	0.0%		t											
1.25"	31.50		100%	100.0%	0.0%		60%	+			++-+				-	╫╫┾		60.0%
1.00"	25.00	100%	100%	100.0%	0.0%	흔	ŀ											g.
3/4"	19.00	100%	100%	100.0%	0.0%	% Possing	50%											50.0% k
5/8"	16.00		100%	100.0%	0.0%	96	50%										1	50.0% _{BR}
1/2"	12.50	100%	100%	100.0%	0.0%		1											
3/8"	9.50	100%	100%	100.0%	0.0%		40%									Ш.	1	40.0%
1/4"	6.30		100%	100.0%	0.0%		1										1	
#4	4.75	100%	100%	100.0%	0.0%		ţ						1					
#8	2.36		99%	100.0%	0.0%		30%					-	1		-	###		30.0%
#10	2.00	99%	99%	100.0%	0.0%		t						\					
#16	1.18		98%	100.0%	0.0%		20%						1					20.0%
#20	0.850	97%	97%	100.0%	0.0%		20% T											20.0%
#30	0.600		82%	100.0%	0.0%		F						\					
#40	0.425	72%	72%	100.0%	0.0%		10%	+-+++	HHHH		++-+		H 1	++++		###		10.0%
#50	0.300		42%	100.0%	0.0%		1						}					
#60	0.250	30%	30%	100.0%	0.0%									ñIII I				
#80	0.180		17%	100.0%	0.0%		0%	100,000	40000-00	10.000	1.00) 	0.10	0	0.01	0	0.0	0.0% 01
#100	0.150	12%	12%	100.0%	0.0%													
#140	0.106		8%	100.0%	0.0%					Particle	Size (mm)							
#170	0.090		6%	100.0%	0.0%													
#200	0.075	4.6%	4.6%	100.0%	0.0%		+ Sieve Size	s	<u></u> ^	tax Specs	_	N	Min Specs	-		Sieve Re	sults	
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moulte apply only to a	tual locations and materials	s tested As a mutual prote	ection to clients, the public	ind ourselves, all reports are :	submitted as the confide	ntial property of c	lients and authoriz	ation for pub	lication of sta	tements cor	chisions or e	vtracts fr	om or regar	ding our re	norte is re	served no	nding our	written annro

Reviewed by: _